



TEKNILLINEN TIEDEKUNTA

STAKEHOLDER MANAGEMENT AND PRIORITIZATION IN A POSITIVE ENERGY DISTRICT PROJECT

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ABSTRACT

Stakeholder management and prioritization in a Positive Energy District project

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The purpose of this study is to construct a model for stakeholder management in a Positive Energy District (PED) project. PED projects are implemented in a context where stakeholders play a vital role in the accomplishment of the project objectives and impact project success with their actions. As all stakeholder claims cannot be fulfilled equally, they have to be balanced and prioritized by project management. Required actions for stakeholder prioritization in inter-organizational projects are examined in the literature review. In the empirical part of the research, a qualitative case study with a narrative approach is conducted in order to analyze the stakeholder prioritization of the case PED project. Based on the findings a model for PED stakeholder management was created, consisting of six steps:

- Optimized detailed plans and land use agreements
- Stakeholder analysis and prioritization
- Early involvement of relevant stakeholders
- Management of collaboration and communication
- Clarification of ecosystem structure and business models
- Involvement of local residents

The study expanded understanding on PED projects' complex stakeholder network and the challenges that are faced in these types of energy ecosystem projects. The findings can be utilized in future PED projects and other inter-organizational energy projects executed in an urban environment.

Keywords: stakeholder management, stakeholder prioritization, business ecosystem, positive energy district

TIIVISTELMÄ

Sidosryhmähallinta ja -priorisointi Positive Energy District -projektissa

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Oulun yliopisto, Tuotantotalous

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Tämän tutkimuksen tarkoituksena on luoda malli Positive Energy District (PED) -projektin sidosryhmähallinnalle. PED-projektit toteutetaan kontekstissa, jossa sidosryhmien rooli projektin tavoitteiden saavuttamisessa ja projektin onnistumisessa on merkittävä. Koska kaikkien sidosryhmien intressejä ja toiveita ei voida toteuttaa tasavertaisesti, niitä on tasapainotettava ja priorisoitava projektijohdon toimesta. Tutkimuksen kirjallisuuskatsauksessa esitellään vaadittavat toimet sidosryhmien priorisoinnille yhteistoiminnallisessa projektissa. Tutkimuksen empiirinen osio toteutettiin kvalitatiivisena ja narratiivisena tapaustutkimuksena, jossa analysoitiin tutkitun PED-projektin sidosryhmien priorisointia. Tulosten pohjalta muodostettiin PED-projektin sidosryhmäjohtamisen malli, joka koostuu kuudesta vaiheesta:

- Optimoitu asemakaava ja maankäyttösopimukset
- Sidosryhmäanalyysi ja -priorisointi
- Relevanttien sidosryhmien aikainen osallistaminen
- Yhteistyön ja kommunikaation johtaminen
- Ekosysteemin rakenteen ja liiketoimintamallien selventäminen
- Paikallisten asukkaiden osallistaminen

Tämä tutkimus laajensi ymmärrystä PED-projektien sidosryhmäverkostosta ja haasteista, joita vastaavanlaisissa energiaekosysteemiprojekteissa kohdataan. Tuloksia voidaan hyödyntää tulevilla PED-projekteilla ja muilla yhteistoiminnallisissa kaupunkiympäristön energiahankkeissa.

Asiasanat: sidosryhmähallinta, sidosryhmien priorisointi, liiketoimintaekosysteemi, energiataseeltaan positiivinen alue

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Oulu, 7.9.2020

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1 INTRODUCTION

1.1 Background

Studies show that stakeholder management and early involvement are critical factors contributing to any type of project's success. Projects are often implemented in a context where stakeholders impact the management's decision-making and play a vital role in the accomplishment of project objectives (Karlsen 2002). Various researchers have acknowledged that project failure does not generally result from lacking project management practices, but from inappropriate social interactions between the stakeholder network (Achterkamp & Vos 2008; Brown & Jones 1998). Stakeholder management in projects is the systematic identification, classification and analysis of project stakeholders and their expectations towards the project in order to increase management's understanding of the diverse stakeholder needs and interests that affect the project outcomes (PMI 2004; McManus 2002). Stakeholder theory acknowledges that in addition to collecting information about stakeholder interests and behavior, these issues need to be taken into account during the actual decision-making processes in order to manage the complex stakeholder network in a coherent fashion (Freeman & Evan 1990).

As many projects are executed in complex and demanding circumstances where various stakeholders pose different expectations towards the project, managing all stakeholder claims equally is problematic (Aaltonen 2010; Greenley et al. 2004). Conflicting interests and constraints on project resources disallow answering to all stakeholder needs evenly while retaining agreed project objectives (Razali & Anwar 2011). In order to balance the competing claims or requirements, project management has to evaluate stakeholders and their claims in a stakeholder prioritization process where requirements concerning the project are placed in an order of importance (Boesso & Kumar 2008; Olander 2007). The prioritization process requires collecting and analyzing information on stakeholders' needs, expectations, backgrounds, strategies and behavior, which can be achieved through early involvement and a well-managed engagement process.

A Positive Energy District (PED) by definition is an urban area with clear boundaries, consisting on buildings of different typologies that actively manage the energy flow between them and the larger energy system to reach an annual positive energy balance

(MAKING-CITY 2019). It is an urban neighborhood that produces its own renewable energy with annual zero energy import and zero CO₂ emissions, working towards a surplus production to be shared with other urban areas. The concept requires a transition from the traditional centrally generated one-way energy towards a more complex and flexible consumption-production model in which energy is transferred back and forth in a network of actors depending on the demand. The carbon neutral energy solutions can include systems like solar panels, exhaust air heat pumps and heat recovery from sewage water. In addition to energy use optimization, there are also social and economic impacts of PEDs, such as transforming the local economy by attracting investors, creating new business models and jobs, and increasing the citizens' quality of life by offering a high and affordable standard of living.

PEDs and other energy efficient and innovative solutions that optimize energy-use through smart interactions between the area's buildings are needed in order to reach the ambitious climate objectives in EU and in Finland. Built environment generates 38% of Finland's CO₂ emissions and covers 42% of the whole country's energy consumption (Rakennusteollisuus 2020). The total carbon footprint of Finland's construction industry takes into account both, emissions from the construction phase and the buildings usage phase. Only 24% of the emissions come from the construction phase, whereas 76% is formed through the energy consumption during the usage phase. (Raivio et al. 2020) Thus, it is important to focus on optimizing energy usage and renewable energy sources and developing frameworks for their implementation.

Carbon neutrality and other green values are a rapidly growing trend among many industries. Investors are valuing environmental responsibility as a sign of competitiveness, consumers are more conscious and willing to pay, and companies that take notice of their carbon footprint are anticipated for better financial success (Raivio et al. 2020). These circumstances are leading to a significant growth of the green building industry, and according to Finland's Ministry of Environment (2020) the investments in green building worldwide are estimated to rise up to 25 trillion dollars in ten years. In addition to decreasing emissions and developing a more sustainable world, this industry opens up new business opportunities and collaboration models that are worth further research.

1.2 Research objectives

The aim of this study is to form a model for stakeholder management specifically for a PED project. PED projects are complex entities with new innovative technologies, various combined energy solutions, construction and renovation, legal aspects and multiple different stakeholders working in collaboration and forming a business ecosystem. The constructed model seeks to define how and why stakeholders should be involved and managed in a PED project in order to maximize positive project outcomes and benefits for all project actors. This study is a part of an EU Horizon 2020 research project MAKING-CITY, where the PED concept is demonstrated and validated in two lighthouse cities, Oulu in Finland and Groningen in the Netherlands. After this, the PED concept will be replicated in six following cities utilizing the results and research findings from the lighthouse projects. Eventually the aim is at 100 PED projects by 2025. This study is conducted in order to strengthen understanding about PED stakeholders and the management of their collaboration in a PED project. The three research questions presented below were set in order to structure the study and reach the objectives.

RQ1. How to analyze and prioritize stakeholders and their claims in an inter-organizational project?

The objective is to define ways through which project management can analyze project stakeholders and prioritize their claims in an inter-organizational project. This subject is examined through the literature review, in which a theoretical basis for stakeholder prioritization is formed by studying prior research linked to the matter. Literature on stakeholder management, analysis, prioritization, strategies and engagement is presented in order to increase understanding of the stakeholder management process in projects and its significance to project success. Stakeholder salience and different frameworks based on it are introduced to lay a foundation for the salience analysis in the empirical research of this study.

In order to increase understanding on stakeholder behavior and coordination in complex projects, literature on inter-organizational projects is reviewed. The emphasis is on the level of integration and the events of the project front-end in these kinds of projects, both of which contribute to stakeholder positions and prioritization in big collaborative projects. Lastly, the concept of business ecosystems is studied by linking it to business

models and business case analysis. This helps to define the structure of the stakeholder network in a collaborative project and the role of individual business models in the entity. All of the studied issues are then brought together in a synthesis of the literature review where the research question is answered in a condensed way.

RQ2. How were stakeholders and their claims prioritized in the case projects?

The second research question is studied in the empirical part of the thesis. The objective is to find out how stakeholder claims were prioritized in the lighthouse PED project in Oulu by forming and analyzing two case narratives about its central events. To lay a foundation for the cases, the PED concept is presented and the background of the Oulu PED project is introduced. Salience analyses are conducted to support both of the cases and demonstrate the stakeholder positions and power usage in them. A big emphasis of the thesis is on the empirical research, as the objective of the research was to form a detailed description of what was done and why during the project in order to develop the PED concept further.

RQ3. What are the steps of stakeholder management in a Positive Energy District project?

The objective is to construct a model that defines crucial aspects for stakeholder management in a PED project. The model is created based on the findings of the literature review and the empirical research, both of which increase understanding on stakeholders' positions and roles in a PED project and the ways management should react to them. The purpose of the model is to explain through which actions stakeholders should be managed, analyzed and prioritized in a PED project, and what kind of consequences are followed if done so.

The research is scoped in a way that examines stakeholder management specifically in the context of project management and inter-organizational projects. The concept of stakeholder prioritization is based on the stakeholder salience theory by Mitchell et al. (1997), complemented by linked frameworks by Olander (2007) and Aapaoja and Haapasalo (2014).

1.3 Research process

The research process of this thesis consists of a background study, literature review, empirical research and an analysis resulting in the eventual model (figure 1). The background study included getting familiarized with the studied phenomena, prior studies and existing literature. In addition, it included analysis on the case project, its earlier events and its current state in order to recognize the type of research that would support the project. This phase clarified the objectives and scope of the thesis and enabled forming the research questions and planning the structure of the literature review and the empirical part of the research.

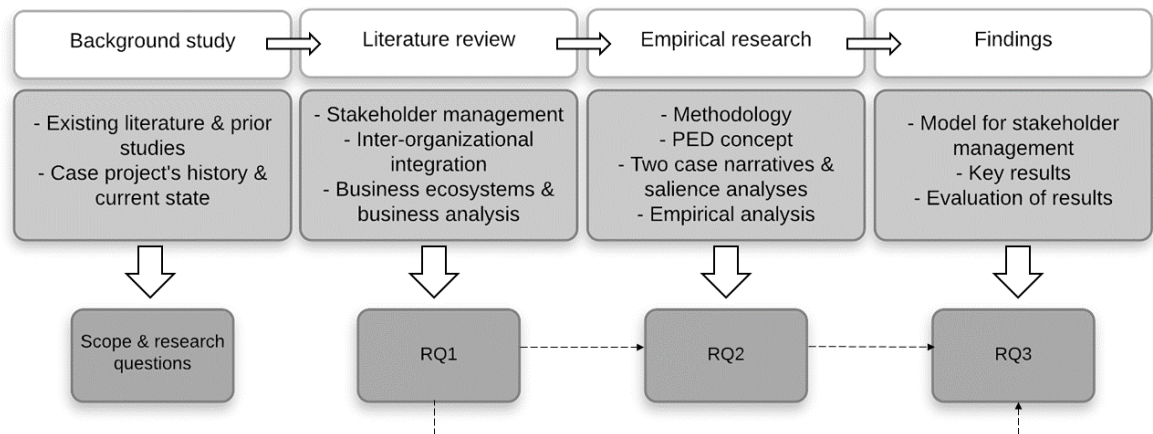


Figure 1. The research process.

The literature review was conducted by studying and presenting prior research concerning stakeholder management, inter-organizational integration and business ecosystems in order to form a solid understanding of the researched phenomena and concepts. Stakeholder management was studied in the context of project management to get understanding on its processes, objectives and significance in the project environment. The entity was further divided into stakeholder analysis, stakeholder prioritization, stakeholder influence strategies and stakeholder engagement in order to focus on the relevant subjects from the case project's perspective. Inter-organizational integration was studied to recognize the characteristics of collaborative projects such as the case project, where multiple organizations with different backgrounds work towards a common

objective. Literature on business ecosystems, business models within them and business case analysis were studied to strengthen understanding on them in order to prepare for the empirical research.

The empirical research of the study was conducted as a qualitative case study with a narrative approach. It focuses to describe the events of the case PED project and consists of a background story followed by two analogical case narratives of the PED events. Salience analyses were conducted about the stakeholders of the two cases using the framework by Aapaoja and Haapasalo (2014) in order to demonstrate stakeholder positions and power in the project. The cases' events, processes, actors and decision-making were analyzed utilizing the findings of the literature review. In order to form the case narratives and salience analyses, data was collected through ten semi-structured interviews, general discussion with project partners, attending project meetings, and going through project documents, contracts, deliverables, newspaper articles and technical plans. The PED concept as well as the characteristics of qualitative and narrative research were studied and presented to lay a foundation for the empirical research and prepare for the interviews and data analysis.

As a result of the study, a model for stakeholder management in a PED project was created based on the findings of the literature review and the empirical research. The model describes how the stakeholders of a PED project can be managed in a way that optimizes project outcomes and benefits all actors. Lastly, the findings of the research were evaluated and the reliability of the study assessed. Future research recommendations were also provided.

2 LITERATURE REVIEW

2.1 Stakeholder management

Stakeholder theory has been studied in literature since 1980s. Freeman's book *Strategic Management: A Stakeholder Approach* (1984), building on the work of Mitroff and Emshoff (1979) and Mason and Mitroff (1982), can be seen as the starting point for the general stakeholder theory in management discussion (Eskerod 2015a; Turkulainen et al. 2015). Since then, the utilization of stakeholder theory has been brought to different business contexts, such as project management (Cleland 1986), product and service development (Hobday et al. 2000; Töytäri et al. 2015), and supply chain management (Mackelprang et al. 2014). In this thesis stakeholder theory is examined specifically in the contexts of project management and inter-organizational relationships.

Almost every project is executed in a context where stakeholders play a crucial role in the accomplishment of the tasks, making the project sensitive to actions and decisions taken by the stakeholders (Karlsen 2002). According to a wide definition, stakeholder is any group or individual who can affect or be affected by the achievement of an organization's purpose (Freeman 1984). Project Management Institute defines stakeholders similarly as "individuals and organizations that are actively involved in the project or whose interest may be affected as a result of project execution or project completion" (PMI 2004). However, these views can be regarded as too broad, since they do not consider who has input in decision-making or who benefits from the decisions, so they merit somewhat all groups as stakeholders. (Phillips 2003; Olander 2007). On the other hand, a view introduced in the Stanford Research Institute (1963) stakeholder definition "those groups without whose support the organization would cease to exist", is perceived as too narrow, as relevant groups are excluded. Bourne (2005) defined project stakeholder somewhere between the aforementioned as an "individual or group who have an interest or some aspect of rights or ownership in the project, can contribute in the form of knowledge or support, or can impact or be impacted by, the project".

Different project stakeholders have various needs and expectations towards the project, which are often in conflict with each other. Since it is unlikely to fulfill all stakeholder claims, stakeholder management processes are needed in order to determine which

expectations are to be met. (McManus 2002) Project stakeholder management is the systematic identification, analysis, and planning of actions to communicate with and impact stakeholders (PMI 2004). It involves assessing stakeholder needs and expectations in relation to the main objectives of the project, and it is crucial in order to determine how the stakeholders are likely to react to project decisions, what influence their reaction will have, and how they might interact with each other and the project managers (Olander 2007; Cleland 1986). Hence, the purpose of project stakeholder management is to enhance the project management's understanding of the diverse stakeholders and approve their ability to make informed decisions about how to engage them in order to maintain their support and align their objectives (Aaltonen & Kujala 2010).

The management of project stakeholders is considered an essential part of project management and an important factor when it comes to project success (Cleland 1986; Olander & Landin 2005). Miller and Olleros (2001) propose that successful projects show exceptional stakeholder management and potentially execute the processes of stakeholder identification, classification, analysis, and management approach formulation. Achterkamp and Vos (2008) argue that project failure does not usually result from ineffective project management practices, but from inappropriate social interactions between the project stakeholders. Project management literature acknowledges various reasons that make stakeholders important for project success: Projects need financial and nonfinancial resources as contributions from the stakeholders; Stakeholders might pose a potential threat to the project and affect the project success negatively by resisting the project objectives; Stakeholders usually take part in establishing the criteria for assessing the project success; The project may affect stakeholders in both positive and negative ways. (Eskerod 2015b; Chinyio & Olomolaiye 2010; Aarseth et al. 2011; Vrhovec et al. 2015) Thus, aligning the various objectives, interests, and claims of different stakeholders directly contributes to the success of the project (Aaltonen 2011; Cleland 1986; Jepsen & Eskerod 2009).

It is typical for the project management literature to see the relationship between the project and its stakeholders as dyadic, meaning it is only between the project and each stakeholder (Eskerod 2015b). In this project-centric approach the project is placed in the middle and the organizational interactions with stakeholders are considered as independent relationships (Missonier 2014). Aaltonen and Sivonen (2009) note that this traditional approach, which views stakeholder management only from the focal

organization's point of view, can be limited since it does not consider the interactions within the stakeholder network. Each stakeholder may have their own set of stakeholders to pay attention to, and a project's stakeholders can sometimes be influenced by each other more than the focal project. Rowley (1997) also points out that the dyadic model does not explain how organizations react to stakeholder pressures because they do not respond to each stakeholder individually. Instead, they respond to the interaction of various influences from the stakeholder network.

Rowley (1997) introduced the concept of "stakeholder multiplicity", where stakeholders are seen as parts of a network rather than the dyadic image. In this concept, it is not only the stakeholders' direct relationship with the focal project that must be considered, but also the structure of the network and the position of a certain stakeholder in the network (Rowley 1997). Stakeholders in the network can influence each other's power towards the focal organization by interacting, communicating and even forming coalitions. Different stakeholders can strengthen the importance of their claim by making same or complementary claims upon the focal organization. On the other hand, they can convolute the stakeholder management work by presenting conflicting claims. This may set the project in danger, as some stakeholders can have relationships to parties that the focal organization considers non-stakeholders, thus giving also them the power to harm the project. (Eskerod 2015a)

2.1.1 Stakeholder analysis

Stakeholder analysis plays an important role in obtaining resources and satisfying project stakeholders (Eskerod & Jepsen 2013). It can be defined as the practice used to identify and assess the salience of key people, groups, or institutions that may influence the success of a project (Bal et al. 2013). It aims to evaluate and understand stakeholders and their relevance to the project, taking into consideration the position, interests, influence, interrelations, past actions, and future potential of stakeholders (Freeman 1984; Blair et al. 1990). Stakeholder analysis helps facilitate the understanding of how to manage stakeholders in unpredictable environments (Aaltonen et al. 2008). Thus, the purpose of the analysis is to increase the project team's chances to anticipate opportunities and problems concerning the project when there is still time for maneuvering (Jepsen & Eskerod 2009).

Stakeholder analysis is not a single tool, but rather a set of different methodologies for analyzing stakeholder interests. The appropriate analysis methods depend on the context of the project. (Crosby 1992) Stakeholder literature includes various studies that present a multi-step process for analyzing stakeholders in different contexts (Freeman 1984; Bunn et al. 2002; Karlsen 2002; Aapaoja & Haapasalo 2014; Matinmikko et al. 2017). The steps that appear in most of these methods are the identification, classification and prioritization of stakeholders, as well as evaluating stakeholder strategies and the dynamic relationships between them.

Identification of the stakeholders who have a direct or indirect relevance to the project is a critical part of the initial project scoping phase (Bal et al. 2013; Freeman 1984). Identifying the stakeholders who can have an influence over the project decisions is necessary for facilitating a managing process that maximizes stakeholder positive input and minimizes their negative impact (Olander & Landin 2005; Bourne & Walker 2005). In addition to identifying stakeholders that are already involved in the project, it is necessary to identify those that have a potential to get involved. Stakeholders can be identified with various methods, including interviews with experts, brainstorming in a group meeting, and using checklists. Using a group of project participants with different backgrounds for the identification process ensures the recognition of more potential stakeholders, but also improves the support to the stakeholder management process. (Karlsen 2002)

In the classification of the identified stakeholders, a typical division is to separate them into internal and external stakeholders. Inside the temporary project organization, internal stakeholders, often referred to as primary stakeholders, are formally members of the project coalition and control the project's resources (Winch 2004). They have a contractual relationship with the project, and they are directly involved in the decision-making processes (Atkin & Skitmore 2008). External stakeholders, also known as secondary stakeholders, do not have a contractual bond with the focal project and have no direct control over the resources. They still have the potential to influence the project or be affected by it. (Aaltonen & Kujala 2010) A stakeholder analysis conducted at the beginning of a project is not enough to manage external stakeholders throughout the project lifecycle. Instead, it should be viewed as continuous monitoring of external stakeholders and their influence on the project. (Cuppen 2016)

Another classification of stakeholders is the division to resource providers and resource dependents by Frooman (1999). Resource providers are the stakeholders who provide a supply of resources to the project or finance it. Resource-dependent stakeholders are those who receive some form of resources from others in the project. (Frooman 1999) Mathur et al. (2008) separated stakeholders according to their attitude towards the focal organization into claimants and influencers. Influencers are stakeholders who cooperate with the project, whereas claimants, especially if not engaged to the project, threaten it. Hence, the intention of paying attention to stakeholders is to avoid or resolve any conflict or opposition to the project. (Mathur et al. 2008)

2.1.2 Stakeholder prioritization

Many projects are implemented in a highly demanding and complex environment where multiple stakeholders have differing interests, objectives, and socio-cultural backgrounds (Aaltonen 2010). Managing a wide range of various stakeholder interests equally is problematic since conflicts among the different stakeholder interests may appear and there are always constraints and limitations on project resources (Greenley et al. 2004; Razali & Anwar 2011). Thus, once the challenging task of identifying and classifying stakeholders is done, their competing claims have to be balanced in a way that doesn't compromise the purpose of the project (Olander 2007).

It is the project management's crucial task to manage the demands of various stakeholders and act as a collector and packer of project requirements to ensure satisfaction for all parties. (Bourne & Walker 2006; Boehm & Ross 1989) To allow sensible decision-making and resource allocating, the different stakeholder requirements must be placed in an order through a stakeholder prioritization process, which allows stakeholders with certain aspects to be at the top of the list (Boesso & Kumar 2008; Razali & Anwar 2011). Stakeholders can be prioritized according to their salience level, interest in the project, possible impact on the project, and their probability to act (Aapaoja & Haapasalo 2014).

Stakeholder salience framework

The stakeholder salience framework, proposed by Mitchell et al. (1997), explains the process of managerial decision-making and identifying the stakeholders that call for the project management's attention. The framework allows classifying and prioritizing

stakeholders according to their possession of three attributes: power, legitimacy and urgency. The combination of these three dimensions determines salience as “the degree to which managers give priority to competing stakeholder claims” (Mitchell et al. 1997). In other words, the salience model helps to identify how much and which type of attention a stakeholder should receive. The more attributes a stakeholder possesses, the more salient their requests are to an organization’s managers (Mitchell et al. 1997; Aaltonen et al. 2008).

Power as a salience theory attribute is defined as “a relationship among social actors in which one social actor, A, can get another social actor, B, to do something that it would not have otherwise done” (Mitchell 1997; Dahl 1957). This means that a stakeholder possessing the power attribute within a social relationship would be in a position to carry out their own will despite resistance of others. Power can arise from a stakeholder’s ability to mobilize social and political forces or to provide or withdraw material, financial, symbolic or physical resources from the project. Power can be separated into coercive, utilitarian and normative power depending on how the power is exercised. Coercive power is based on force or threat, utilitarian power comes from material or incentives, and normative power is based on symbolic resources without any physical threat or reward. (Mitchell et al. 1997)

Legitimacy comes from a perception or assumption that the actions of a stakeholder are desirable, proper, or appropriate within a socially constructed system of norms, values, beliefs and definitions (Mitchell et al. 1997). It is also argued that stakeholders that follow prevailing institutionalized practices in their business possess the attribute of legitimacy and thus increase their survival prospects (Meyer & Rowan 1977). Therefore, project management usually pays more attention to stakeholders whose claims they find to be legitimate. Legitimacy can be due to society, organization or individual, and the legitimacy of a stakeholder increases if there is a contractual relationship with the project. (Aaltonen & Kujala 2010) However, Discroll and Starik (2004) point out that legitimate claims do not necessarily make the stakeholder salient in the eyes of the focal project organization, if it isn’t paired with either the power or the urgency to enforce that claim.

Urgency is defined as “the degree to which stakeholder claims call for immediate attention” and it can be further divided into two features: time sensitivity and criticality. Time sensitivity describes the degree to which a managerial delay in attending to the

relationship is unacceptable to the stakeholder. Criticality indicates the importance of the claims to the stakeholder. (Mitchell et al. 1997) Stakeholder claims are more likely to be considered urgent if they are aligned with the project's goals and easy to implement. Urgency of a claim can also change during the project. For example, in the project phase where final budget decisions have to be made, claims with considerable cost implications are more likely to be considered urgent. (Aaltonen & Kujala 2010) Other factors that can influence the urgency of a claim are political agendas, threat of resources' unavailability, rates of return, and administrative calendars (Yang et al. 2014).

In the salience theory a stakeholder can possess one, two, or all three of these attributes. Stakeholders with only one attribute are called latent stakeholders, and they do not stand out with salience in the eyes of the project management, but they are also not likely to give attention or acknowledgment to the project themselves. A *dormant* stakeholder possesses power to impose their will, but they lack the legitimacy and urgency to back up their claims. *Discretionary* stakeholders have legitimacy but no power or urgency. The stakeholders that possess only the attribute of urgency are called *demanding*. Without any enforcement to their claims, they might come off as bothersome but not dangerous to the project. (Mitchell et al. 1997)

The combination of two attributes makes for an expectant stakeholder, whose salience level is moderate. They have an active stance, and the level of engagement between project management and these stakeholders is likely to be higher. *Dominant* stakeholders are both powerful and legitimate and their influence in the project is assured. With legitimate claims and the ability to act on them, their expectations are relevant and matter to the management. Dominant stakeholders can have some formal mechanisms in place acknowledging their importance to the firm, and corporations can produce informative reports to them. (Mitchell et al. 1997)

Dependent stakeholders have urgent, legitimate claims but lack the power to prosecute them. Thus, they depend on the actions of others to carry out their will. These stakeholders can try to satisfy their claims by using the assistance of other stakeholders with power. For example, a local resident can be a dependent stakeholder with urgency and legitimacy, but without help from some dominant stakeholder, they cannot affect the firm or the project. *Dangerous* stakeholders possess power and urgency without legitimacy to their claims. They can be coercive and possibly violent, so they can put the project, company,

stakeholder-manager relationship or individuals in danger. It is important to identify dangerous stakeholders in order to prevent their influence on the project. (Mitchell et al. 1997)

Definitive stakeholders possess all three of the attributes, making them the highest priority to managers and requiring most attention. When a stakeholder has legitimate and urgent claims with the power to enforce them, management has an immediate mandate to attend to those claims and prioritize them. It is always possible that an expectant stakeholder gains the final attribute and becomes definitive, so it is necessary to pay attention to all three categories of expectant stakeholders. (Mitchell et al. 1997) The stakeholder classes determined by the number of salience attributes possessed by stakeholders are shown in figure 2.

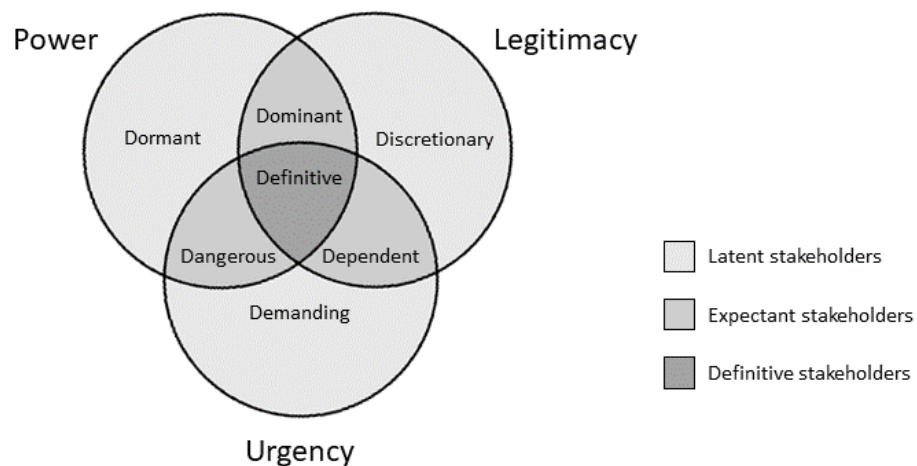


Figure 2. Stakeholder salience classes (modified from Mitchell et al. 1997).

Since changing project characteristics in different phases of the project can have an impact on stakeholders' attributes, stakeholder salience doesn't remain in a steady state during the project lifecycle (Aaltonen & Kujala 2010). According to Mitchell et al. (1997), the attributes can be seen as variables operating upon a continuum, which means they can change for any stakeholder as the project goes on. As the stakeholders' salience has a dynamic nature, a stakeholder can either gain more attributes by practicing certain influence strategies or decrease their salience by losing attributes (Mitchell et al. 1997; Aaltonen & Kujala 2010). A common occurrence is the movement of a dominant

stakeholder into the definitive class by gaining urgency for some reason (Mitchell et al. 1997).

In addition to assessing the stakeholder attributes and classes, it is important for the project management to evaluate the stakeholders' position towards the project: are they proponents or opponents? (Olander 2007) Proponents are the parties interested in the project who have a positive and direct stake in it, while opponent stakeholders are the ones with negative attitude towards the project's objectives (Winch 2004). McElroy and Mills (2000) further divided stakeholder position into five different levels: active opposition, passive opposition, not committed, passive support, and active support. A project's decision-making process has to be alternated according to the position each stakeholder has towards the project (Olander 2007). Proponents are usually viewed to have higher salience in the eyes of project management (Aapaoja & Haapasalo 2014).

Impact/probability matrix

Besides determining the position and attributes of a stakeholder, it is also necessary to evaluate the impact they can have on the project, as well as the probability they will use the possibility to make that impact. To this purpose, Olander (2007) developed the stakeholder impact/probability matrix by updating the more traditional power/interest matrix by Johnson and Scholes (1999). According to Olander (2007), the power/interest matrix is problematic since it lacks dynamism: power is hard to assess on a scale and the level of interest does not necessarily mean anything. Thus, the level of power was replaced with the impact each stakeholder has on the project, and interest was replaced with the probability to act, as seen in figure 3. (Olander 2007)

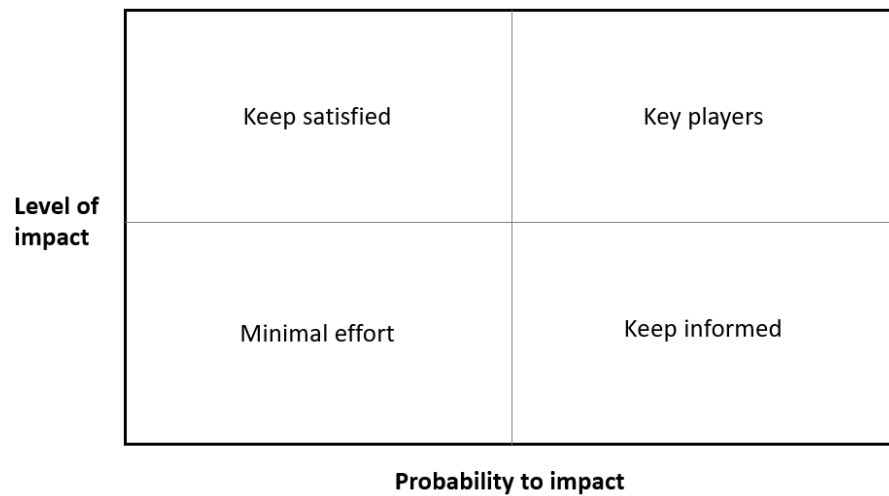


Figure 3. The stakeholder impact/probability-matrix (modified from Olander 2007).

To place stakeholders on the matrix, two questions have to be asked: “How interested is each stakeholder in expressing their interest, expectations, or contributions towards the project? (probability to impact)” and “Do they have sufficient leverage to do that? (level of impact)” The placement of a stakeholder in the matrix then indicates the type of relationship the project management should create with them: Key players, keep satisfied, keep informed and minimal effort. “Key players” are usually the ones with responsibilities for the project, while “keep informed” stakeholders include different interest groups with lower impact, such as local residents or non-governmental organizations. Stakeholders in the “keep satisfied” section usually have requirements or even the power to stop the project, but not necessarily a personal interest in it, and it often includes national governments or authorities. “Minimal effort” stakeholders are not viewed as salient or focal, but they should still not be ignored. (Olander 2007)

Stakeholder assessment matrix

Aapaoja and Haapasalo (2014) combined the stakeholder salience framework by Mitchell et al. (1997) and the impact/probability matrix by Olander (2007) resulting in a stakeholder assessment matrix (figure 4). According to the authors the more salient the stakeholder is, the higher level of impact they have. Thus, the Y-axis now describes the salience of the stakeholder, placing them in order of importance, while the X-axis describes the stakeholders’ probability to impact or ability to contribute to the project.

Placement in the matrix according to the two features determines the type of the stakeholder: key player (primary team member), keep informed (key supporting participant), keep satisfied (tertiary stakeholder), or minimal effort (extended stakeholder). Compared to Olander's (2007) matrix the positions are in a different order, which highlights the importance of stakeholder salience. To be a key player, a stakeholder has to possess at least two of the three salience attributes. (Aapaoja & Haapasalo 2014)

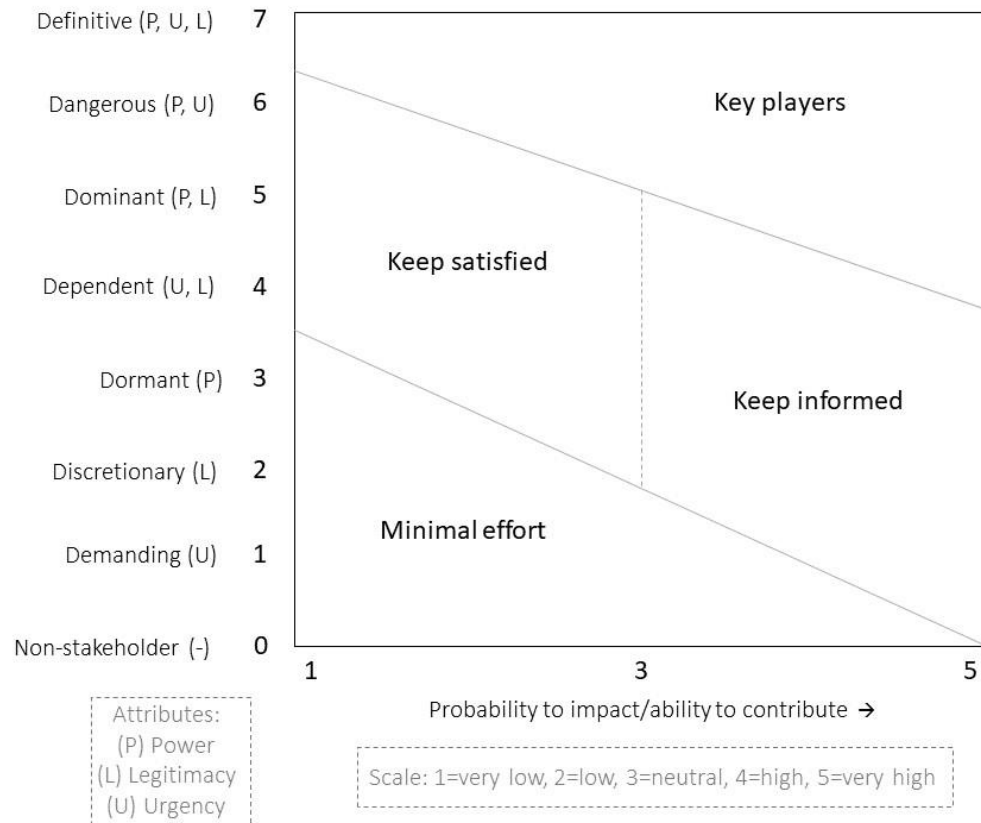


Figure 4. Stakeholder assessment matrix (modified from Aapaoja & Haapasalo 2014).

The different stakeholder types in the matrix are derived from earlier stakeholder management literature (McManus 2004; Donaldson & Preston 1995; Johnson et al. 2008). Primary team members and key supporting participants are internal stakeholders, while tertiary and extended stakeholders represent external stakeholders. Primary team members usually form the core group of the project, making unanimous decisions and resolving conflicts. They have considerable involvement and responsibilities throughout the project, such as managing the project requirements. Key supporting participants also have a crucial role in bringing their knowledge and expertise to the project, but functions on their responsibility are more discrete. Tertiary stakeholders are not formal project

members with a central role, but they expect something from the project and can influence it. They can also provide inputs and resources that have an effect on the project implementation, so their identification is necessary. Extended stakeholders have no direct control over resources, but they may have an interest in the project. This stakeholder type can include media, non-governmental organizations or local residents, for example. (Aapaoja & Haapasalo 2014)

2.1.3 Stakeholder strategies

Stakeholders' position on the focal project does not remain steady state during the project lifecycle, since stakeholders' salience attributes and their potential to take action have a dynamic nature (Aaltonen & Kujala 2010). There are multiple ways for stakeholders to strategically shape their position on the project and increase the likelihood of their claims being considered by the project management (Frooman 1999; Hendry 2005). This can be done by using different influence strategies through which stakeholders can try to influence the project management's decision-making process (Aaltonen & Kujala 2010). The nature of the resource relationship between the stakeholder and the focal project determines which kind of influence strategy will be used (Frooman 1999).

Frooman (1999) identifies four types of stakeholder influence strategies: direct withholding, indirect withholding, direct usage and indirect usage. This classification is based on resource dependence theory, indicating that a firm's need for resources provides opportunities for the stakeholders to gain control over it. Withholding strategies are defined as "those where the stakeholder discontinues providing a resource to a firm with the intention of making the firm change a certain behavior". The method of withholding is different with each stakeholder: Employees can withhold labor with a strike, and creditors can withhold debt financing by nonrenewal of loans, for example. Withholding is possible in a situation where the stakeholder has the ability to walk away from the relationship with no harm to itself. Direct withholding means that the stakeholder itself manipulates the resource flow to the firm by its own means. In indirect withholding the stakeholder works through an ally, who then manipulates the flow of resources to the firm by withholding them. (Frooman 1999)

In usage strategies the stakeholder continues to supply a certain resource, but with attached conditions. This occurs in a situation where the stakeholder is not in a position

to walk away from the firm, and the welfare of each is linked to the other. Thus, usage strategies are chosen when the stakeholder wants the firm to change its behavior but does not want to withhold completely. Direct usage means that the stakeholder sets their own set of constraints towards the use of the resource. Usage can also be done indirectly through an ally, for example by starting a letter-writing campaign using the help of the public. (Frooman 1999)

Aaltonen et al. (2008) introduced a set of eight stakeholder influence strategies through which stakeholders can shape their attributes and increase their salience level. They are somewhat overlapping with Frooman's (1999) model but include six new, more generic strategies based on the research that was carried out. The six new strategies include resource building strategy, coalition building strategy, conflict escalation strategy, credibility building strategy, communication strategy, and direct action strategy. In resource building strategy stakeholders acquire and recruit critical and capable resources to themselves and try to increase their power attribute this way. Coalition building strategy is used by stakeholders who want to influence the legitimacy of their claims. They do this by forming alliances with other, preferably more legitimate project stakeholders. Another way to increase one's own legitimacy is the conflict escalation strategy, where stakeholders attempt to escalate a conflict beyond its initial project related causes in an attempt to make the project an arena for non-project related battles. Credibility building strategy also increases legitimacy and it consists of acquiring credible and capable resources like individuals with a good reputation or networks. Urgency can be increased by using the communication strategy, which means using different types of media to communicate about the project. It can also be influenced by using the direct action strategy, which can include actions such as protests or road blockades. (Aaltonen et al. 2008)

Like stakeholders, project management can also use various strategies to respond to the pressures and claims expressed by the project parties. These response strategies are means enacted by project management to shape the attributes or positions of stakeholders during the project. (Aaltonen et al. 2015) Managers should choose their response strategies according to the position of the stakeholder (Olander & Landin 2005). There are many studies that focus on finding out the response or decision-making strategies used by the focal project management (Freeman 1984; Savage et al. 1991; Clarkson 1994; Chinyio & Akintoye 2008; Aaltonen & Sivonen 2009). They all have similar features

from either fully collaborating with stakeholders to only giving them minimal effort or no attention at all.

2.1.4 Stakeholder engagement

Multiple project management researchers have acknowledged that inappropriate social interactions between the project stakeholders often lead to project failure to some extent (Achterkamp & Vos 2008; Brown & Jones 1998; Missonier 2014). Stakeholder engagement means involving stakeholders in a positive manner in organizational activities and developing relationships with them (Greenwood 2007). It includes actively giving and getting support and working together to plan and develop new business solutions (Bal et al. 2013). A well-managed stakeholder engagement process is essential for stakeholder analysis and decision-making and should be conducted as early as possible, since it is the only way to recognize stakeholder requirements, needs, wishes and concerns (Yang et al. 2009). Jeffery (2009) argues that organizations do not decide whether they want to engage stakeholders or not; the only decision is when and how successfully they are going to be engaged. Engagement helps the stakeholder network to increase the comfort and quality of the collaboration as well as the economic sustainability of the project (Bal et al. 2013).

The ideal stakeholder engagement process should be an iterative process that enables learning from previous actions, with adequate time and resources dedicated to its execution (Jeffery 2009). Stakeholders can be engaged through many different methods, such as newsletters, flyers, workshops, customer focus groups, community town meetings, or information evenings (Helin et al. 2013; Johnson-Cramer & Berman 2005). Appropriate technologies and timeframes for the engagement should be chosen according to the context of the project and development level of stakeholders. The engagement activities require clear roles and scope about the objectives to be achieved. The engagement process should be targeted at those most likely to be affected by the project. (Sequeira & Warner 2007) Inclusion of too many project stakeholders might take focus away from the most critical resource providers, i.e. from the stakeholders the project is dependent on (Welch & Jackson 2007).

Stepping onto a more specific level of stakeholder engagement, general stakeholder theory includes the concept of information orientation versus communication orientation

(Deetz 1995; Eskerod 2015a). This means that management has the possibility to either merely keep their stakeholders informed by practicing one-way communication, or fully engage them in the discussion. In information orientation the stakeholders simply receive the information on what has been done, for example via newsletters or flyers. Communication orientation is applied when stakeholders are invited to be a part of the dialogue by performing stakeholder engagement, possibly in the form of workshops or information evenings. (Helin et al. 2013) Different stakeholder groups require different kind of attention, and the management has to determine which approach is adequate in each case (Eskerod 2015a).

Communication and information are vital parts of projects, and the communication needs in different project phases have to be acknowledged and planned (Lohikoski et al. 2015). Involving stakeholders in a conversation about underlying assumptions, values, and agenda setting allows the development of better and socially desirable solutions (Cuppen et al. 2016). At the beginning of a project, during the conceptualization and planning phases, communication is focused on the project's content and plan. In addition, the rules of behavior must be established, and the team's purpose defined. (Katzenbach & Smith 1993) In the project execution phase communication focuses on clarifying the goals and objectives of the project, and on enhancing motivation (Mukherjee et al. 2012). After the project, communication includes ensuring exchange of information on documents, results and lessons learned for future projects (Turkulainen et al. 2015).

Since the communication needs change over the project lifecycle, the stakeholder groups which communication is focused on, and the communication modes also evolve. The chosen mode of stakeholder communication in a particular project phase is determined by the salience of the stakeholders in that phase. With low-salience stakeholders the communication and information needs are lower, so the emphasis is on using impersonal communication modes. More advanced personal and group modes of communication are utilized with highly salient stakeholders that pose bigger needs of communication. (Turkulainen et al. 2015)

2.2 Inter-organizational integration

A single organization may not hold all the relevant expertise internally, in which case inter-organizational networks are formed to access information and knowledge outside

the organization's boundaries (Conway 1995; Newell & Swan 2000). Projects bring together a wide range of interdependent stakeholders, who form a dynamic inter-organizational network to reach desirable project objectives (Ruuska et al. 2011). Traditionally, shared work in the construction industry has been fragmented and mainly based on bilateral contracts where each stakeholder tries to optimize their own operations and risks, without working innovatively towards customers' objectives (Aapaoja et al. 2012). In this way of thinking, project success is determined by the success of a single firm instead of the whole project team (Cornick & Mather 1999). These challenges have led to seeking and developing new, increasingly collaborative forms of project delivery, that enable deeper collaboration between the stakeholders (Davies et al. 2007; Lahdenperä 2012)

In his research of the new forms of collaborative project deliveries, Lahdenperä (2012) lists three relational project delivery arrangements (RPDA) that are based upon a relationship of trust between the parties, and in which responsibilities and benefits are shared fairly and transparently. The RPDAs are project alliancing, project partnering and integrated project delivery, all of which share similar features that are lacking from the traditional project delivery methods. (Lahdenperä 2012) RPDAs are characterized by the equality of key participants, sharing financial risks and rewards and aligning the interests of all stakeholders to result in a win-win situation (Yeung et al. 2007). The basis of these project delivery forms is in cooperative and trustful climate along with commitment to collaboration targeted at continuous improvement. Another defining factor is the early involvement of key participants with the aim to integrate versatile expertise in the critical design phase of the project. (Lahdenperä 2012)

Stakeholder integration is an opportunity for both private and public organizations to achieve more than they could on their own (Lank 2006). The aim of this kind of integration is to enhance the effectiveness and efficiency of the project delivery to the customer (Aapaoja et al. 2012). When collaboration brings together complementary stakeholders with different ideas and contributions, it is one of the most powerful ways to achieve desired outcomes for all project stakeholders (Ghassemi & Becerik-Gerber 2011). According to Newel and Swan (2000), networking with other individuals and organizations is in many cases crucial for the development of new products, processes, and innovation in general.

Integrating the activities of various departments inside an organization is a challenging task for the management, but it is even more problematic to integrate the activities of multiple different organizations (Axelsson & Axelsson 2006). Part of the challenge is that inter-organizational relations are usually more loosely coupled than intra-organizational ones, as the different organizations do not share a common management hierarchy, but instead have to do more or less voluntary co-operation or collaboration between each other (Weick 1979). Integrative collaboration can be divided into two dimensions, vertical and horizontal integration, according to their hierarchy model (Hvinden 1994; Axelsson 2002). Vertical integration takes place between organizations that are on different hierarchical structure levels, requiring processes of supervision and control to coordinate the decision-making on different levels. This form of integration demands binding guidelines, rules and regulations, as well as adequate monitoring and reporting of performance. Horizontal integration is the division of labor between organizational units on the same hierarchy level, making it the more common way of collaboration in inter-organizational projects. This requires information exchange, consultation, and conflict resolution between the parties. (Axelsson 2002)

Inter-organizational projects bring together various types of management structures, legislations, financial conditions, professional competences, and cultural values, which naturally cause the participants to have different targets and objectives of the project outcome (Löfström 2009; Bertelsen & Koskela 2004). Despite of this, the actors have to work in collaboration sharing not only benefits, but also risks that the project creates for them, in order to complete the project successfully (Vrijhoef & Koskela 2000; Baiden et al. 2003). Creating a cohesive integrated team requires strong commitment, dedication, communication and mutual trust between the participants (Ghassemi & Becerik-Gerber 2011; Aapaoja et al. 2012). According to Newell and Swan (2000), trust plays a vital role in dealing with uncertainty and risk in a project and is about accepting vulnerability in situations where the possible damage could outweigh the advantage.

2.2.1 Integration intensity

Inter-organizational collaboration does not necessarily always mean that the collaboration practices between the parties are intensive (Kokkonen & Vaagaasar 2018). However, the stronger the ties and the more intense the interaction is between the stakeholders, the more valuable the collaboration is perceived (Matinheikki et al. 2016). Thus, the level of

integration and tie strength can have a direct impact on project value creation (Lechner et al. 2010). The intensity of collaboration and integration of stakeholders can be increased by various methods. (Kokkonen & Vaagaasar 2018)

One of the critical factors in strengthening project stakeholder integration is co-location of project participants in the same physical space (Khanzode & Senescu 2012). Co-location brings various benefits in addition to enhancing integration: it increases the communication between stakeholders, lowers barriers to work with latest information, speeds up problem solving processes, fosters learning, improves project effectiveness, and thus lowers the amount of design errors and iterations and decreases project lead time (Zenun et al. 2007; Rafii 1995; Teasley et al. 2000; Baiden et al. 2006; Khanzode & Senescu 2012). Co-location advances face-to-face collaboration practices between individuals and encourages informal communication, which improves the spirit of teamwork and increases trust among the stakeholders (Rafii 1995; Bushnell et al. 2013; Cannella et al. 2008). Face-to-face interactions between project parties have especially been recognized as beneficial for accomplishing complex tasks (Stryker et al. 2012). However, as the inhabitants of the collaborative space come from different companies with their own culture and routines, co-located practices can become challenging (Jones & Lichtenstein 2008).

Co-location can be carried out through the concept of Big Room, which is understood as a physical, collaborative working space, where project parties with differing business backgrounds come together to work on a common project in order to achieve better quality for the customer (Khanzode & Senescu 2012; Dave et al. 2015). Using Big Room changes the project parties' negotiation behavior towards a more collaborative form and lowers the barriers to work with the latest information (Raisbeck et al. 2010; Khanzode & Senescu 2012). However, as it requires almost constant presence of project participants and allocating all time resources to a certain project, physical Big Room is impossible to implement when it comes to smaller projects where actors work on multiple projects at the same time. (Dave et al. 2015)

Modern technologies have created a new organizational reality where virtual work within and across organizations is common and physical interaction is not a prerequisite for success (DasGupta 2011). Virtual Big Room enables the concept of co-location through novel information and communication technologies, forming a platform that will

facilitate collaboration between project stakeholders throughout the project lifecycle. It must enable project teams to work interactively and physically at the same time, since some parts of the team usually can work face-to-face, while others have to take part virtually. The usage of Virtual Big Room eliminates the need to relocate staff members, enables effective knowledge sharing mechanisms allowing cross project knowledge transfer, and this way enables a successful way of project execution. (Dave et al. 2015)

Matinheikki et al. (2016) highlighted the importance of frequent informal and formal meetings in strengthening inter-organizational relationships. On a less concrete level, integration can be intensified through creating a fair and respectful atmosphere, where each team member is allowed to present their ideas concerning the project having an equal opportunity to contribute to the delivery process (Lahdenperä 2012). Another critical factor is ignoring organizational boundaries and working as a team with a mutual focus and objectives (Fleming & Koppelman 1996; Lahdenperä 2012). When difficulties occur, the focus of the teamwork has to be on problem solving and prevention of repeating the same mistakes instead of finding out who is guilty (Dainty et al. 2001).

2.2.2 Project front-end

Aaltonen et al. (2015) defined the project front-end as the set of activities from the project's idea generation to the more detailed planning phase. During this time the project's common goals, objectives, concept, design options, scope and direction are shaped by an evolving network of various organizations (Aaltonen et al. 2017). In a different approach Morgan (1987) defined the front-end as that period when time, money and human resources are expended on a project without any guarantee of return. The front-end stage of a project plays a crucial role in ensuring strategic project success (Morris 2013). In strategically failed projects, it is likely that the problem can be traced back to the early-phase decisions, when the initial idea was developed (Samset & Volden 2016). The early stages of a project are generally known to be characterized by high levels of uncertainty, ambiguity, and dynamic stakeholder interactions (Florice & Miller 2001; Kolltveit & Gronhaug 2004) According to Aaltonen et al. (2017), this phase should be viewed as an iterative and drifting process of organizing, affected by unexpected stakeholder influences.

According to recent research, project front-end is considered a strategic pre-project stage, where the project network starts to emerge, and value creation appears in the form of joint goal alignment and formulation of agreeable project definition (Edkins et al. 2013; Artto et al. 2016; Morris 2013). The early-stage dynamics of an inter-organizational project are defined by the influence behavior of the project stakeholders, as their salience may either increase or decrease (Aaltonen et al. 2015). This is the time when stakeholder positions are shaping and the possibility of stakeholders influencing the project's decision-making is at its highest (Aaltonen & Kujala 2010; Miller & Olleros 2001). During this stage, individual stakeholders attempt to balance their position in the network and maximize their own value creation in relation to the common project-level objectives (DeFillipi & Sydow 2016; Aaltonen et al. 2017). Thus, in an inter-organizational project with dynamic complexity and multiple conflicting goals, it is important to consider the different actors' interests in a well-planned and flexible stakeholder management process during the front-end (Aaltonen et al. 2015).

Recent project research has moved the early stage managerial emphasis from traditional project management methods towards stakeholder analysis and engagement (Matinheikki et al. 2016). An important method for the new approach is the early identification and involvement of different stakeholders from the beginning of the project (Kolltveit & Gronhaug 2004). Early involvement allows projects to utilize the knowledge base of the stakeholders, thus having a direct impact on the value creation of the project as well as the achievement of the objectives. (Mitropoulos & Howell 2002; Olander & Landin 2005; Bertlesen & Koskela 2004) Aapaoja et al. (2012) argue that customer requirements and the contents of the project are recognized better when stakeholders are involved in the process from the beginning. Early involvement also deepens the integration between the project actors. (Aapaoja et al. 2012) The involvement at an early phase should concern both internal and external stakeholders, since both of those groups might have requirements and contributions regarding the project (Beringer et al. 2012)

According to studies (Möttönen et al. 2009; Aapaoja et al. 2013), early decisions reduce unnecessary changes and rework during later phases of the project and even the total lifecycle costs. Kent and Becerik-Gerber (2009) state that under the right conditions, early collaboration can directly reduce problematic fragmentation between the design and construction parties that would result in inefficient work and valuable changes later in the project. Another benefit of early stakeholder involvement is that it leads to a higher

likelihood of a more effective design, improved construction operations, synchronized procedures, and less scrap. It provides knowledge about the customer's or end-user's requirements and leads to higher customer satisfaction and more efficient operations in terms of meeting the buyer's needs. In addition, early involvement allows room for creative solutions and intensive exchange of ideas. (Dowlathahi 1998; Valkenburg et al. 2008)

2.3 Business analysis

2.3.1 Business ecosystems

The concept of business ecosystems was introduced by Moore (1993), who defined it as a group of organizations crossing many industries working simultaneously cooperatively and competitively in production, customer service and innovation. Iansiti and Levien (2004b) describe business ecosystem as a loose network of interconnected actors depending on each other for their mutual effectiveness and survival. In an ideal situation, the actors in the ecosystem share resources, knowledge and technologies to provide basis for comprehensive value creation via the ecosystem (Hearn & Pace 2006). Each participant adds their particular aspects of offering to the common value generated by the ecosystem (Camarinha-Matos et al. 2009), taking part for their own benefit, but sharing the total value created (Kinnunen et al. 2013). Thus, a business ecosystem can be viewed as a community that creates new innovations to its business environment, generating success and capital (Moore 1993).

The business ecosystem approach to a network of organizations emphasizes its members' symbiotic, co-evolving relationships and their ever changing, dynamic nature (Hearn & Pace 2006; Zahra & Nambisan 2012). In an ecosystem the organizations make conscious decisions and have many kinds of cooperative and competitive interactions, which lead to co-evolution and a partially shared future (Peltoniemi et al. 2005). According to Corallo (2007), participants in a co-evolutionary relationship place different pressures on others, which results in them influencing other's evolution. Business ecosystems are always located in a dynamic environment with various influencing aspects, such as political, cultural, legal and social. (Peltoniemi et al. 2005)

In the early phases of a forming ecosystem, the central actors work together with essential stakeholders to define new customer value propositions based on innovation, determine how to deliver those propositions, and design business that serves the potential market (Moore 1993). The ecosystem does not have to be built from scratch, as the entity can be formed by adjusting existing business models to save time, effort and costs (Zahra & Nambisan 2012). After the birth of the ecosystem, the lifecycle consists of expansion, leadership, and self-renewal (Moore 1993). According to Iansiti and Levien (2004a), business ecosystems are characterized by the structure, relationships, connections, and different roles among its stakeholders. The functional roles of the stakeholders will change with the evolution of a business ecosystem (Lu et al. 2014). Thus, the ecosystem bonds should not be managed as a steady state throughout the ecosystem lifecycle, but instead modified and redesigned through the principles of continuous improvement (Zahra & Nambisan 2012). Iansiti and Levien (2004a) identify three fundamentally distinct roles in a business ecosystem: keystone, dominator, and niche player.

Keystones have a vital role in the core of the ecosystem, developing its value creation, providing steady assets, increasing productivity, improving robustness and advancing niche creation. They maintain the health of the ecosystem, and if they were to be removed from the network, it is likely that the whole ecosystem goes down. Dominators aim to progressively take over their ecosystem, typically damaging the health of it by reducing diversity, eliminating competition, limiting consumer choices and stifling innovation. They leave little space for other actors to leverage their services and provide additional functions. Niche players focus on building up their own capacity, knowledge and assets, while producing resources to other ecosystem members. They provide a lot of value and innovation to the ecosystem by focusing on their own specialty. (Iansiti & Levien 2004a)

2.3.2 Business models

As business models have actively been discussed in the literature for the last twenty years, various different points of view for business model definitions, concepts and frameworks exist (Morris et al. 2005; Al-Debei 2008). Osterwalder and Pigneur (2009) define business model as a representation of how an organization creates, delivers and captures value, but also as a blueprint for strategy to be implemented through organizational structures, processes and systems. Similarly, Shafer et al. (2005) define it as a representation of a firm's underlying core logic and strategic choices for creating and

capturing value within a value network. Roos (2014) argue that different business models consist of similar blocks on the generic level, but in reality, they are company specific. A business model should be positioned between strategy level and operations, and address four core areas: customer dimension, value proposition, organizational architecture, and economic dimension (Fielt 2013; Osterwalder 2004).

Suikki et al. (2006) created a framework that divides business model components into three classes, including offering, value creation system and revenue model. A company's offering explains what they offer to customers, who are the customers, and how money is brought to the company through sales. Value creation system is defined by the stakeholders who form the value chain around the core business of the offering. (Suikki et al. 2006) Value chain is an entity of activities in a process-like chain through which the offering is made (Porter 1985). Revenue model describes the profit paths, cost structure, market details, and share of the total value created in the network (Suikki et al. 2006). In other words, it explains how and from whom the revenue is built in order to cover expenses and other financial activities (Rajala et al. 2001).

Generally business model frameworks include direct connections from the focal company to its stakeholders, including customers and co-operators. Thus, a business model provides a way of explaining the relationships between a firm and its stakeholders (Kinnunen et al. 2013). When companies' value chains are linked to each other in an ecosystem, they form a value chain network consisting of individual value chains from different industries (Tsvetkova & Gustafsson 2012). Similarly, when multiple actors are operating in an ecosystem, describing the business models of these actors will provide an interlinking view on the ecosystem, explaining the interconnections between the actors. The linkage between the actors' business models can hereby be used to describe business ecosystems, where every business model has its own role (figure 5). The ecosystem's offering can be seen as the composition of the actors' offerings, and the position of one actor in the network can change over time depending on their resources, capabilities, offering and financial performance. (Kinnunen et al. 2013)

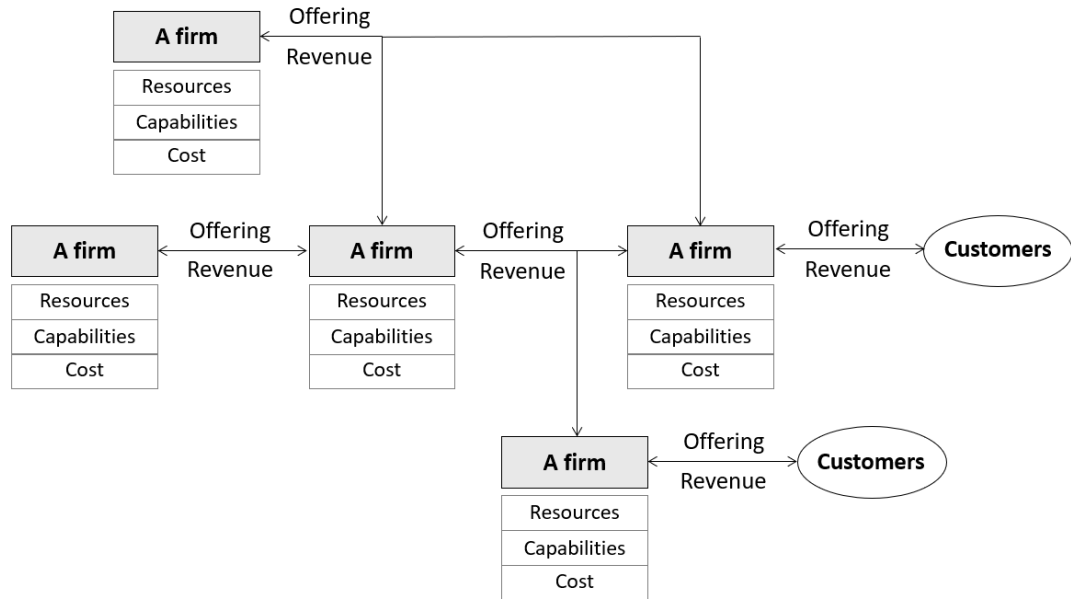


Figure 5. Business ecosystem viewed as linked business models of actors (modified from Kinnunen et al. 2013).

2.3.3 Business case analysis

Most companies have more ideas than they have available resources, such as funding or people (Koen et al. 2001; Schmidt 2004). After generating and collecting the ideas, companies must decide which are worth further development, before substantial effort is committed (Kinnunen et al. 2011) Business case is a term used to describe the evaluation of potential investments and the selection of best options (Keen & Digirius 2002; Reifer 2001). Business case analysis is a tool for describing the business reasons for why and which investment alternatives should be selected (Keen & Digirius 2002) and choosing the best method of allocating scarce resources to achieve an objective (Maroni 1995). The main goal of conducting a business case analysis is to help management determine the true business value of potential investments. The analysis should be done systematically to ensure that all the needed information is gathered and enable comparison between cases. (Kinnunen et al. 2011)

Business case analysis is conducted with a broader scope than a simple cost comparison between alternatives (Randall et al. 2012). Financial analysis is needed to assess the numbers behind the investment, but in addition, analysis of technological competence, target market, competitor data, and risk factors should be included. The readiness of the technology needed in the business case has to be mature enough in order to estimate the

development costs also in the future. Markets and customer needs must be assessed to find the best business opportunities in the market and to deliver value by satisfying those needs. The new opportunity's fit to the company strategy must be analyzed to ensure it matches with future plans and goals. Otherwise the commitment to allocate resources to the business case cannot be made. Business case analysis has to be conducted on companies' own terms and the extent and depth of the analysis can be adjusted to match a specific business context (Kinnunen et al. 2011).

2.4 Synthesis of the literature review

A single organization may not hold all the relevant expertise to their business model internally, in which case inter-organizational networks are formed to access information and knowledge outside the organization's boundaries. Projects bring together a wide range of interdependent stakeholders with various types of management structures, financial conditions, competences and cultural values, who form a dynamic inter-organizational network to reach project objectives. A more permanent inter-organizational network is a business ecosystem, where a group of loosely interconnected actors depending on each other work simultaneously to generate value for customers, each actor adding their own expertise to the common offering. Each participant in a business ecosystem has its own business model addressing how the organization creates, delivers and captures value within the value network. Describing the linkage between the actors' business models can hereby be used to explain the function of the business ecosystem and its value chain network.

In both, projects and ecosystems, stakeholders play a crucial role in the accomplishment of the tasks and contribute directly to the value creation, making the offering sensitive to actions and decisions taken by the stakeholders. Different internal and external stakeholders have various and often conflicting needs and expectations, that are impossible to fulfill equally. Stakeholder management processes are needed to enhance management's understanding of the diverse stakeholders and determine which expectations are to be met. Stakeholder management is the systematic identification, analysis, and planning of actions to communicate with and impact stakeholders, that includes assessing stakeholder interests in relation to the main objectives of the project.

Stakeholder management is crucial in order to obtain resources, satisfy project stakeholders, and determine how they are likely to react to project decisions.

Since a wide range of different stakeholder claims cannot be managed equally because of conflicting interests and constraints on resources, they have to be balanced in a way that does not compromise the purpose of the project. For sensible decision-making the different stakeholder requirements must be placed in an order through a stakeholder prioritization process, considering their salience level, interest in the project, probability to act, and possible impact. The stakeholder salience framework by Mitchell et al. (1997) allows prioritizing stakeholders according to their possession of three attributes: power, legitimacy and urgency. The more attributes a stakeholder has, the more salient their requests are to an organization's managers. Stakeholders use various influence strategies to shape their position on the project and increase their salience to influence the project management's decision-making. Aapaoja and Haapasalo (2014) combined the salience framework with Olander's (2007) impact/probability matrix, resulting in a stakeholder assessment matrix that allows dividing stakeholders into primary team members, key supporting participants, tertiary stakeholders and extended stakeholders.

The dynamic stakeholder network starts to emerge in the early stages of a project, making the project front-end a crucial time for stakeholder integration. This is when stakeholder positions are shaping and the possibility of stakeholders influencing the project's decision-making is at its highest. Early stakeholder involvement allows projects to utilize the knowledge base of the stakeholders, recognize and satisfy customer requirements better, deepen the integration, and enable intensive exchange of ideas between the project actors. Early decisions reduce unnecessary changes and rework during later project phases, even the total lifecycle costs and lead to more efficient operations, thus having a direct impact on project value creation. The level of integration also influences project value creation directly, and it can be strengthened through a well-managed engagement process, co-location or common virtual workspaces, frequent formal and informal meetings and communication, ignoring organizational boundaries to work towards mutual focus and objectives, and building mutual trust.

The synthesis of the literature review is pictured in figure 6, which summarizes the answer to research question one.

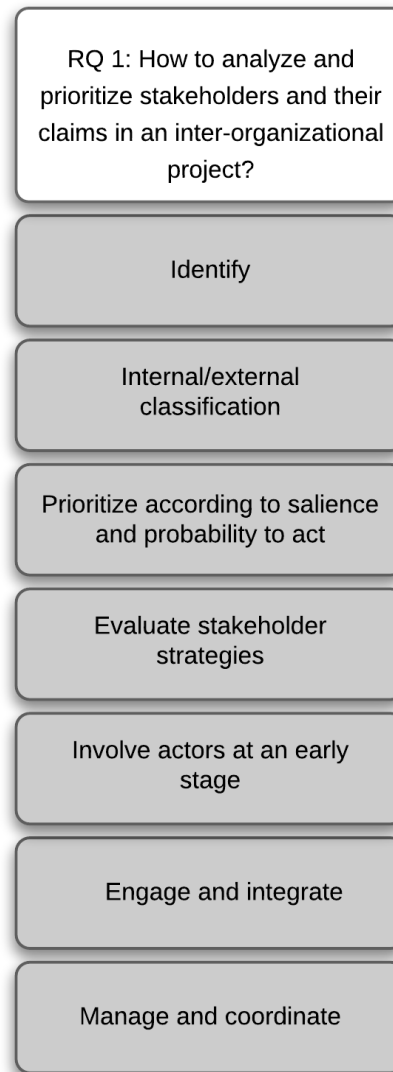


Figure 6. The steps required to analyze and prioritize stakeholders and their claims according to the reviewed literature.

3 EMPIRICAL RESEARCH

The empirical research of this study is conducted in an EU Horizon 2020 project where Positive Energy Districts (PEDs) are piloted in Oulu and Groningen and later replicated in six following cities. This part of the study aims to break down the prioritization of stakeholders and their claims in Oulu's PED project by forming two case narratives and examining the stakeholder management within them.

3.1 Methodology

The empirical part of this study has been conducted as a qualitative case study with a narrative approach (Crow & Berggren 2014) on material collection. To answer the second research question, two analogous case descriptions of the project were created using the data collected during the research. These narratives provide a context for examining the prioritization of stakeholders and their claims in the case project. Data was collected through multiple semi-structured interviews, thematic discussion with project partners, attending project meetings, and going through project documents, contracts, deliverables, newspaper articles and technical plans.

3.1.1 Narrative research

Narrative research seeks to understand human experience and social phenomena by collecting and analyzing stories from different people. It is an effective way of organizing complex sets of facts, experiences, observations and actions. (Crow & Berggren 2014; Denzin & Lincoln 2000) Narrative research is not a specific method, but rather a loose framework that focuses on stories as a means of describing reality (Heikkinen 2001). Narrative studies are often conducted in research fields of health, human development, psychology and social work (Andrews et al. 2008), making it an unusual approach to matters of project and stakeholder management. However, it was seen as an appropriate approach for this study, as it provides a way of collecting and emphasizing the various points of views of the different stakeholders. It enables combining the possibly conflicting and delicate opinions and forming an intact case narrative that shows the most important actors and events that affected the project.

In a qualitative case study (Yin 2010), a narrative approach provides an opportunity to understand and explain the events, processes and people that impacted the researched phenomenon. It often brings up tacit information that can be beneficial for various actors when processed and analyzed. (Nonaka & Takeuchi 1995) Narrative methods enable the researcher to see different and sometimes contradictory layers of meaning, to bring them into useful dialogue with each other, and to understand more about individual and social change (Andrews et al. 2008). As the interviewees see the phenomena in the context of their own mindset and describe the events from their point of view, the narrative must be viewed as a frame to which new approaches are added as the story is forming. (Denzin & Lincoln 2000; Clandinin & Rosiek 2007) Challenges of the narrative approach are linked to its subjective and context dependent nature; it can be used to produce an authentic view on reality, but it is not realistic to expect reaching the objective truth (Clandinin & Rosiek 2007; Heikkinen & Syrjälä 2007). Thus, it is noted that in this research the case narratives are collections of subjective experiences and combinations of various “truths”.

Narrative research method offers no general rules about suitable materials or modes of investigation. Instead, it gives the opportunity to collect data in multiple ways; recorded everyday speech, interviews, diaries, documents, newspaper articles, and meeting memos amongst other things. (Andrews et al. 2008) According to Creswell (2007), among the main qualitative research designs, narrative has the least prescribed procedure for the data analysis as well. This allows the researcher more freedom to create a procedure appropriate for a specific study. The versatile possibilities of data collection and analysis that the narrative approach offers were considered when choosing a suitable research method for this thesis.

3.1.2 Data collection

Data for the empirical research was gathered using various methods in order to form a wholesome narrative for the two cases. Semi-structured interviews were held to get a description of the project events and actors from multiple perspectives. In order to get an understanding of the case project and prepare for the interviews, project meetings were attended, and general discussions were had with some project actors. These discussions helped to scope the research and collect data to further plan the empirical study. In addition, the project’s EU level deliverables were explored to learn more about the PED

concept, lighthouse cities, technical solutions, project organization and roles, different stakeholders and project objectives.

Later in the study, different documents were looked through to complement the information gathered in interviews. Project meeting memorandums clarified the events from earlier years of the project, showing the decisions made in each meeting. Land use contracts between different project partners revealed more details about the roles, responsibilities and schedule of the PED area. Technical plans and drawings were looked into in order to grasp the structure of the Kaukovainio PED energy network that works as a platform for the new collaboration and business models. Lastly, different project-related websites and newspaper articles were studied to get a better understanding of the project stakeholders and events.

Empirical interviews

Ten semi-structured interviews were arranged with different project-related actors to collect data for the empirical research. All of the interviews were held remotely via video conferencing applications due to the existing pandemic circumstances. The interviews were held with one person at a time, with duration of the interview ranging from 30 minutes to 2 hours. The interviewees, listed in table 1, were selected from relevant project partner organizations based on their position in the project and knowledge of the PED project's events. Since the empirical study was conducted with a narrative approach, it was important to get various different points of view from multiple lines of business. The interviewees' perspectives varied depending on their background; whether their approach was energy, land use or management related, affected their perception of the studied phenomena.

Table 1. The interviewees and their organizations.

Job title	Organization
Geodesist	City of Oulu
Urban planner	City of Oulu

Project Manager	City of Oulu
Development Manager	City of Oulu
Postdoctoral Researcher, Urban Design and Planning	University of Oulu
Principal Scientist	Research Center
Development Manager	Energy Company
Development Engineer	Energy Company
Construction Manager	Housing Company
Project Engineer	Grocery Company

The aim of the interviews was to increase understanding on the project's background, important events, powerful actors, common objectives and occurred challenges in order to form two wholesome case descriptions. The structure of the thematical interviews was relatively light with broad questions on the researched themes. The aim was to have an interactive conversation that could be taken to any necessary direction depending on the interviewees' knowledge and attitude towards the questions. The questions had to be planned in a way that encourages the interviewees to reveal relevant details about the stakeholder network in order to conduct a salience analysis of the actors. This was done by presenting more indirect questions on the collaboration and decision-making in general.

Each interview started with general questions about the interviewee, partner organization and project. The rest of the questions were related to either collaborative work in the project, the stakeholder network, the actual cases, or more specific themes of the person's expertise. The more specific themes were related to for example energy issues, city administration, urban planning and land use, or EU projects. While holding the

interviews, it was important to give up any preconceptions or assumptions about the subjects and give the interviewees space to explain their views on their own terms. All of the interviews and questions were planned separately and thoroughly to maximize the information gain from each conversation. Extra questions were added during the conversations when needed. The interview questionnaire with the most used questions is attached in the thesis as appendix 1. All of the interviews were recorded and transcribed, and the results will be analyzed in the empirical study.

3.2 Positive Energy District (PED)

Traditionally, energy has been centrally produced by big power plants, transmitted into cities and then distributed among the various consumers. This landscape is quickly changing as cities today have a vital role to play in tackling climate change by significantly reducing their carbon emissions and rethinking energy supply chains. This energy transition includes a structural shift from a system mainly based on finite energy sources such as fossil fuels, towards a renewable energy based system, where energy efficiency is increased, and energy demand is better managed. MAKING-CITY is an EU project funded under Horizon 2020 programme ensuring a long-term vision for energy transition by demonstrating the urban energy system transformation towards smart and low-carbon cities, based on the Positive Energy District (PED) concept. The PED concept will be tested and validated in two lighthouse cities, Oulu in Finland and Groningen in Netherlands, after which it will be replicated in various following cities.

According to MAKING-CITY project (2019), a Positive Energy District (PED) is “an urban area with clear boundaries, consisting on buildings of different typologies that actively manage the energy flow between them and the larger energy system to reach an annual positive energy balance”. A PED can also be described as an urban neighborhood with annual net zero energy import and net zero CO₂ emissions working towards a surplus production of renewable energy to be shared with other urban zones. The total energy balance is the energy taken from outside the district minus the energy delivered inside the district. The concept is based on the interaction and integration between buildings, the users and the regional energy, mobility and ICT system. This requires a transition from the traditional centrally generated one-way power towards a more complex and flexible consumption-production model, which enables utilizing renewable energy sources, local

storage, demand-response, user interaction, data management, communication and trade between peers. These decentralized systems create new operational challenges but also allow for new business opportunities and revenue streams.

To reach the European energy and climate targets and ensure long-term vision for energy transition, urban development must move from individual building solutions to Positive Energy Districts, Neighborhoods and other similar concepts. A Positive Energy District combines built environment, sustainable production and consumption, and mobility to reduce energy use and greenhouse gas emissions and to create added value and incentives for the consumer. The objectives of a PED project include boosting the use of renewable energy, waste recovery technologies, and innovative storage solutions to reduce greenhouse gas emissions. PEDs will also improve energy efficiency, maximize the positive annual energy balance, and optimize the amount of energy produced at the district level. In addition, there are social and economic impacts of PEDs, such as transforming the local economy by attracting investors, creating new business models and jobs, and increasing the citizens' quality of life by offering a high and affordable standard of living.

Reaching climate neutrality and energy surplus through the PED concept requires enablers such as political vision and governance framework, active involvement of problem owners and citizens, integration of energy and urban planning, ICT and data management. This change also requires transformation of the cities' infrastructure, giving an important role to legal advisors, public authorities and investors, as well as regulation areas such as energy regulation, environmental legislation, procurement rules and land use. Thus, the planning of the PED concept presents major technological, economic and social challenges and passes through a long-lasting bureaucratic process. Aligning multiple city departments and other stakeholders on common ground with shared objectives is demanded in a smart city project, as traditionally government departments and private partners have been working in their own silos. A challenge for PED projects is overcoming the silo mindset and changing the management style towards open collaboration and transparently shared data to achieve the common goals more efficiently. A vital part of the transformation is strong leadership of public sector.

Setting up a PED is a very complex project involving several stakeholders, each with their own interests and constraints. Large-scale deployment of PEDs calls for developing

sustainable business models that cover the whole process of building, operating and maintaining PEDs and engage all stakeholders. This requires a structured, integrated and innovative approach embedded within the city's overall vision that is based on a co-creation process involving all relevant actors. A key aspect in reaching the objectives of a PED is the interactions between stakeholders involved in the district: Each member of this value chain creates value for not only the customers, but also other stakeholders impacted by the new services. This is why in addition to evaluating business models and the offering to customers and end-users, it is important to assess the affect a single actor has on the operations of the whole ecosystem. For this purpose, the stakeholders of a PED should be mapped with details of individual business models as well as their linkage to other actors. Another challenge for PEDs is taking into consideration all relevant external stakeholders with actions like educating and engaging the local community on the benefits of a PED. Managing both, the internal and external stakeholders requires a high degree of coordination.

3.2.1 PED methodology

MAKING-CITY project has been creating a methodology for the optimal path of planning and deploying PEDs in the lighthouse cities and later for the replication in the follower cities, which can be seen in figure 7. The methodology looks to harmonize cities' spatial planning with energy planning, and it consists of six phases that highlight the importance of inclusiveness, co-creation and participatory planning. The methodology begins with a thorough diagnosis of the city, addressing main city needs and priorities in terms of energy aligned with urban planning, land-use planning and urban design. This phase includes analyzing existing detailed plans and energy demands as well as establishing city level indicators with the help of local authorities, citizens, researchers, planners and designers. To explore opportunities for PED implementation, cities can utilize their strategic land-use plans while considering the aims of the city, long-term visions, energy network operators, private sector and citizens. Suitable areas for the implementation have to be profiled and financial schemes and innovative potential business models analyzed. This phase may also contain citizen and stakeholder engagement strategies.

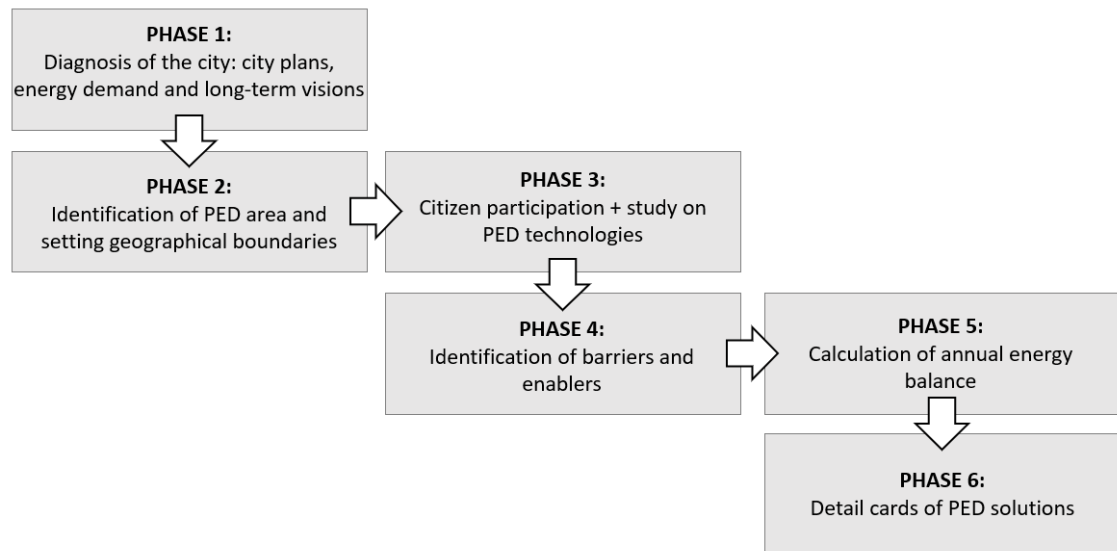


Figure 7. PED methodology created by the MAKING-CITY project.

The second phase includes the identification of the best PED area and setting its geographical boundaries. There can be several buildings within a larger district that are interconnected with each other in terms of energy grids, such as district heating or cooling system. The official boundary of the PED has to be set in order to calculate the annual energy balance and plan the area further on.

Phase three is divided into two separate but parallel actions: citizen participation and a technical study on PED technologies. Citizen participation focuses on including the perspective of end users in the process in order to determine needs, desires and requirements as well as increase transparency. This can be done by conducting a social-cultural analysis of the district, exploring citizens' preference and attitude towards energy issues, collecting expectations and requirements and encouraging communication between the PED stakeholders and citizens. If residents are not properly included in the process, they might end up opposing the eventual outcome. The technology study focuses on designing the energy solutions, delivery of energy services, management and trading of locally generated energy and grid-based supplies, and integration of infrastructures. The inputs of phases one and two are evaluated and the particular technical and non-technical solutions are linked to the obtained data.

In the fourth phase, barriers and enablers for the PED solutions are identified and evaluated. Barriers can be any political, economic, social, technical, environmental, legal

or spatial constraints, which have to be overcome in order to continue to next phases. In phase five the annual energy balance of the PED is calculated in order to verify the planned surplus of energy. If there is no surplus regarding energy demand, energy use, energy distributed and primary energy balance, new technical solutions from phase three must be assessed. Phase six concludes the methodology with the main output, SPECs, which are detailed solution cards explaining the selected solutions. SPECs involve general data, technical and graphical details, implementation time, initial investment and financial models, stakeholder mapping, integration with other smart solutions, potential for replication and expected impacts of all the solutions. This final output guides cities with detailed information on the technical and non-technical issues of solutions.

3.3 Kaukovainio PED

In this chapter, the background of the Kaukovainio PED project is presented in order to lay foundation for the two cases. The background story is formed based on the interviews and project documents, and it explains which decisions and decision-makers affected the project, how the various stakeholders got involved, what are their roles, and how the collaboration started. Different stakeholders are *italicized* in the text when mentioned for the first time to highlight their involvement in the process. The background story covers the timeline from the mere idea of a PED to the application phase, and eventually starting the accepted project.

3.3.1 Background of the PED project

In 2017, certain actors in Oulu started to develop an interest in Oulu becoming a lighthouse city for a Horizon 2020 EU project, and the potential for demonstrating smart city technologies and business models in Oulu was acknowledged. It was noted that these types of lighthouse projects had started a positive development for other cities, and it was seen as a possibility to help reach Oulu's environmental objectives and support the current strategy. Amongst other strategic environmental goals, the *City Council* of Oulu had adopted the Sustainable Energy and Climate Action Plan in 2012, aiming to move the city towards a sustainable urban energy transition through actions like reduction of carbon gas emissions and increasing renewables as energy sources. However, it was also clear that a project of this size with multiple big partners, and collaboration in new technologies would be a challenging one. The process from idea level to concrete actions begun when

a *research coordinator* representing the *University of Oulu* in the Oulu Innovation Alliance, Northern City with Attractive Opportunities ecosystem, started to look more into the lighthouse city requirements, experiences of other lighthouse cities, and possible ways of implementation while gathering more relevant stakeholders, such as the *City of Oulu representatives*, into the conversation.

A *Finnish Government-owned Nonprofit Technology Research Center*, later in the text *Research Center*, was asked along to plan the technical solutions of the possible PED idea. They started working on the idea with the university and the city and began to take a significant role in the project. Within the city administration, the discussion continued in the *Urban and Environmental Services*, ensuring that all relevant units were brought into the conversation to make this big decision. Eventually the *City Board* decided that the city of Oulu, with its partners, would be applying to be a MAKING-CITY lighthouse city. After this, the planning of the application could fully start. A *Spanish Nonprofit Research Institution*, later in the text *Coordinator*, agreed to become the coordinator of the project in both lighthouse cities: Oulu and Groningen. The Coordinator is a multidisciplinary center that develops R&D projects, financed by private companies or through public funds. Their role is to support public entities, such as city councils and regional governments, plan and develop high impact projects.

The next step was deciding the area inside Oulu that would fill the requirements of the project call and become the PED pilot district. The *city geodesist*, responsible for land use agreements, brought the district of Kaukovainio into the conversation, based on two policies: the existing land use program covering and the progress of the City's programme aiming to regenerate low growth districts in danger of social challenges. The city plan of Kaukovainio had been worked on since 2010, when a workshop with *local residents* revealed dissatisfaction with certain parts of the district. As a result, it was decided that the shopping center and its surroundings would be fully renewed over the next years, and land use agreements of the properties were to be revised as well. Land use agreement is a contract between the city and the landowner, where they agree on the execution of the detailed plans, as well as rights and responsibilities of the parties. It has to state certain details, such as the types of buildings, schedule of construction and level of rent, in order for the city to develop different areas in a controlled way. In the City of Oulu, the *Land and Surveying Unit* is responsible for making these agreements with the actors. The recently renewed detailed plans and land use agreements helped to lock the decision on

Kaukovainio PED: the district was an urban development area, the center was to be regenerated anyway, and a lot of new construction was already planned for suitable locations. It was also known that the area of Kaukovainio, located near the city center of Oulu but still having a decreasing number of residents and property value, was in need of a rebranding, and energy issues were seen to fit this plan.

With these existing land use agreements came the rest of the partners for the potential PED, and the Research Center could start designing the energy network ecosystem and its actors. A *City-owned Rental Housing Company*, later *Housing Company*, had a contract for several new buildings and retrofitting of existing ones near the Kaukovainio center, some of which were included in the PED plan. Nearby these properties, a *Private Construction Company*, later *Construction Company*, had contracts for new buildings, with a schedule that allowed them to start construction and sales a year before the Housing Company. These agreements had been made by the city in order to increase the non-subsidized residential construction in the area, to avoid Kaukovainio becoming a merely rental housing district. Later in the PED project, these contracts came to play a notable role, since they determined the schedule for all construction in the area.

A central role in the PED's energy network was put on a big *Finnish Grocery and Restaurant Cooperative*, later *Grocery Company*, that had an agreement to build the new shopping center with their grocery store in it. This grocery store would utilize heat pump technology while cooling their products, producing heat not only for their own heating purposes, but also distributing it to other PED buildings. A *City-owned Energy Company*, as the only energy supplier operating in the Oulu region, joined the project with another key role. They own the district heating network that works as a base for all Kaukovainio PED solutions, and they started to plan and design the energy network together with the Research Center, Grocery Company, Housing Company and Construction Company.

Most of the partners were relatively easy to get along to the PED project. Especially the City-owned Rental Housing Company, since they have more flexibility to make decisions with long-term commitment within the projects of the City of Oulu, and clear strategic plans. Most of the partners had experience of working with each other in earlier projects, which also made the decision to start a collaboration this big slightly less risky. Funding-wise, the organizations in Horizon 2020 projects are provided with a 70-100 % EU funding rate for their costs, which enables them to take part in these types of RDI projects.

The most consideration of joining was done by the Energy Company and the Construction Company, which would still be carrying possibly the biggest risks as a private company or a company with needs for extensive investments on infrastructure. All of the partners and their roles in Kaukovainio PED project are listed in table 2.

Table 2. Kaukovainio PED partners and their roles in the project.

Partner organization	Role in the PED project
Spanish Nonprofit Research Institution (Coordinator)	Coordinating on the EU level, coordinating work packages, collecting reporting, managing the entity
University of Oulu	Recognizing the idea of a PED in Oulu, gathering the project group, coordinating research, supporting the partners, coordinating allocated tasks
City of Oulu	Decision-making and enabling, land use control and urban planning, coordinating on local level, organizing meetings
Finnish Government-owned Nonprofit Technology Research Center (Research Center)	Planning and designing the innovative energy systems, forming the project application, managing the technical planning, implementing a measuring system, coordinating a work package on Evaluation framework and social innovation
City-owned Energy Company (Energy Company)	Planning, investing and implementing the energy systems, measuring and maintaining, owner and operator of district heating network

Finnish Grocery and Restaurant Cooperative (Grocery Company)	Building a grocery store that produces heat for the PED network
City-owned Rental Housing Company (Housing Company)	Building two new apartment buildings + renovating one apartment building with innovative energy solutions, enabling monitoring of PED solutions
Private Construction Company (Construction Company)	Building (expectedly) two new apartment buildings with innovative energy solutions

Next it was time to answer to the EU Horizon 2020 project call and apply for the lighthouse city position. Locally, the application was done as a collaboration with all of the Kaukovainio PED partners, as it needed input from all organizations. The application preparation process was highly technology driven and focused on the energy solutions that would form the PED system. The Research Center was responsible for organizing and coordinating regular technical meetings in which the technical solutions, processes and investments were planned with the whole project group. At this phase, the Coordinator wanted to ensure that Oulu's project group had plausible and realistic plans of piloting the PED in order to convince the *European Commission* that Oulu was able to demonstrate these new technologies and deserved the lighthouse title.

This was also the time to consider collaborative business models, financing, budget, investment limits, roles and responsibilities of different actors. Later on, some of these details were to be alternated or changed altogether, as the reality of roles, resources and constraints became clearer. Eventually the application got accepted, and Oulu's local project group was ready to start working towards a PED in Kaukovainio. The project launched in December 2018 to go on for the next 60 months. At the beginning, the City of Oulu was not able to appoint a project manager for the PED project. This led to a shared leadership arrangement where the project partners took responsibility in turns depending

on the issue. In March 2019, a *Project Manager* started working in the PED project for the City of Oulu.

3.4 Cases

3.4.1 Case 1: Apartment buildings

The first case revolves around the collaboration between the City-owned Rental Housing Company and the City-owned Energy Company in the PED project. In order to take part in the PED, the Housing Company builds two new apartment buildings and renovates an existing one to fit the PED energy network. Energy solutions for these buildings are planned and implemented as a collaboration of these two companies, but the events of the case involve many more project stakeholders. In this case, the events, decision-making and actors of the PED project are scrutinized from the apartment building's point of view in order to provide a context for assessing the stakeholder management and prioritization in the project. A foundation for this case has been laid in the previous chapter, "Background of the Kaukovainio PED project", where the circumstances and actors have been presented more precisely. This chapter starts with a narrative of the case and moves on to the salience analysis of the case stakeholders. Different stakeholders are *italicized* in the text when mentioned for the first time to highlight their involvement in the process.

Case narrative

In 2010, the district of Kaukovainio was on the table of the *Urban Planning Unit* of the City of Oulu. The district was located only three kilometers from the city center and was known for its greenness and woods, but it still had started to lose its residential appeal. The area used to have close to 8000 inhabitants at its peak, but now the amount was under 5000, and it was clear that upgrading and rebranding actions were needed. When a workshop revealed that local residents were mostly unsatisfied with the center Kaukovainio, plans of renewal started to form around the shopping center and its surroundings. These circumstances led to Kaukovainio becoming a prioritized urban development area that would undergo regeneration activities over the following years resulting in an integrated master plan for land use, environment and transport.

Around the same time, the Housing Company had expressed its interest to build new rental housing in Kaukovainio area several times. The private Construction Company also had wishes to build apartment buildings in the area. As the Urban Planning Unit wanted to ensure a diverse housing stock in the area, land use agreements were made by the Land and Surveying Unit with a schedule that allowed for the Construction Company to start their non-subsidized construction and selling before the Housing Company. A few years later, in 2017, the district of Kaukovainio came to conversations again when the PED lighthouse plans started to develop in Oulu, and discussion on the topic was started between the University of Oulu, City of Oulu's Urban and Environmental Services, and the Research Center.

When the district was noted as a promising option for the location of the PED, the companies with existing land use agreements were invited to the conversation. A precondition for the PED was to have these actors come along and plan the energy solutions into their upcoming buildings and construction plans. The Housing Company was willing to take part in the PED project with their own conditions. They wanted to ensure that their *residents*, being the *end-users* of the solutions, would never be affected negatively because of living in a building that utilizes these new technologies and takes part in an energy network. Heat and hot water should work impeccably in spite of the new PED plans, and residents should only experience positive impacts of the project.

After the necessary partners were brought together, it was time to start planning the actual PED area, its geographical boundaries, technical solutions, schedules, and roles and investments of the heat network actors. The application for the EU project call had to be made with the help of the Coordinator, and for that purpose the structure of the PED had to be figured out. This phase included meetings organized by the City of Oulu and the Research Center with the whole project group attending, smaller meetings with just some of the actors and emailing information back and forth. Big roles in this phase were taken by the Research Center and the Energy Company, both of which had expertise in energy network issues and the needed technologies. For the Housing Company this phase meant planning their own premises in the PED system. It was decided that they would take part in the PED with three buildings: demolish one of their existing apartment buildings and build a new one on the same spot, build one completely new building in a different spot, and renovate a third apartment building. These plans would require significant investments and a lot of work during the upcoming years.

Even though the meetings were organized regularly and all of the partners were present, a lot of the communication and coordination was left to the companies themselves in the planning phase. Some parties felt that the City of Oulu and a project manager should have taken a firmer managerial role both in the planning phase, and in the collaborative work in general. The cooperative work in the meetings was lacking clear roles and a leader of conversation, which sometimes led to ineffective discussions with lessened focus. Often times the parties who were the most vocal about their needs got their demands through, but the big picture of the whole project was unclear to some. Even though every actor had their own objectives, investment budgets and decisions in the project, they needed someone to manage the schedules, responsibilities and information flow in a wider scope.

Eventually the application was accepted by the European Commission. At this point, towards the end of 2018, the Energy Company started to rethink the energy system planned in the application. The system was supposed to have centralized energy production with a single heat pump, which would have required building a low temperature heat distribution network infrastructure beside the district heating network already existing in Kaukovaio. For various reasons, building an overlapping infrastructure solely for the PED project purposes did not seem like the most sensible decision anymore. Further planning had unveiled that the agreed budget in the application did not cover the costs of the new low heat network, and it had significant risks concerning construction schedule and technical challenges. In addition, the planned system did not enable possible expansion of the PED in the future, since new buildings could not be connected to it easily.

The Research Center together with the Energy Company started to actively change the plans for the energy distribution system from the centralized solution to a decentralized one. One big heat pump was replaced with four smaller ones that would operate in different buildings of the PED, and heat would be distributed between actors through the existing district heating network. This was a fundamental change that caused close to a year of delay in the project as the technical solutions for each PED building had to be rethought and investments recalculated. On the EU level, only the original plan was accepted and confirmed to receive funding at this point. Because of the differing from the original plans, all of the investments were now riskier as there was no certainty of receiving funding for them. The Coordinator was also keen to retain the old plan presented in the application and changing major details in the once approved plan turned out to be

time-consuming and bureaucratic. The energy positivity of the area would still have to be ensured despite the modifications, which required calculating and planning. This period of time caused delays and uncertainty in the work of all actors.

The next step was to plan the details of the decentralized system. The Housing Company did their planning in collaboration with the Energy Company, and it included a lot of technical investigation, designing the size and usability of the systems to make them work in the specific buildings, sharing responsibilities, and counting costs in order to ensure profitability of the investments. The energy solutions included exhaust air heat pumps, heat recovery from sewage water, and solar panels amongst other things. It was acknowledged that a competent supplier was needed in the implementation of the energy systems, since the project did not allow time or resources for the partners to develop something new themselves. The markets had to be searched for a supplier that had the knowledge and technologies tested and ready for this kind of operation. All the while the Housing Company was also going through many of their own processes to prepare for the upcoming renovation and construction work, such as organizing new living arrangements for their current residents in the soon-to-be demolished building. They also organized an information event for the residents in the PED buildings together with the city and the university.

The Housing Company and the Energy Company conducted the bidding competition of the suppliers together, and a competent *system supplier* was found and chosen for the project. Currently the project is in construction and installment phase for two of the buildings. One apartment building is still on hold, waiting for the permit to start because of the schedule settled in the land use agreements; the Housing Company has to wait for one year after the Construction Company has started construction. This arrangement has caused inconvenience to the Energy Company, since their EU funding is dependent on the depreciation costs of equipment and infrastructure. Meaning, they cannot access the project funding before the equipment is installed and the depreciation costs can be compensated. Thus, the best and least risky option for the Energy Company would have been building the apartment buildings and energy solutions as soon as possible without any waiting periods.

The final collaborative business model between the Housing Company and the Energy Company has not been settled yet. There is no contract between the actors, and instead,

the collaboration is based on verbal agreement and mutual trust. Both of these companies have made investments in the energy equipment that will be utilized when producing heat to the PED network. The basis of the energy system is in the Energy Company's district heating network, but the new equipment will be operating in the Housing Company's buildings, making them the platform of the energy production. The Energy Company will also utilize surplus heat from the Housing Company in their own energy production. This arrangement makes the pricing policies complicated: What kind of compensation should the Energy Company give to the Housing Company for utilizing surplus heat? Who owns the heat produced with the shared systems? Should the energy pricing encourage towards the most energy efficient solution or maximize the profit of the actors? Can the pricing policies eventually prevent the possibility of new, innovative energy solutions?

The conversation on the pricing and final compensation model will be faced autumn 2020. The final compensation model should be flexible enough to take every situation into account. The business model should be beneficial to all actors even during the summertime when surplus heat is not necessarily needed but it is still produced to the network. Some actors feel like it is impossible to lock down prices before the energy systems are in use, and the actual data on the surplus energy and operating efficiencies will be known. Some speculate that there could be a tentative contract with directional prices that ensure security of the actors and prevent a situation where one side benefits more.

Salience analysis

The following stakeholder salience analysis, in figure 8, is conducted with the matrix by Aapaoja and Haapasalo (2014). The Y-axis describes the level of salience of each stakeholder, while the X-axis describes their probability to impact or ability to contribute in the case. The placement in the matrix divides the case stakeholders into four classes: key players, keep informed, keep satisfied and minimal effort. The salience analysis is conducted based on the collected data and the preceding case narrative. The reasonings behind every actor's placement in the matrix are explained in this chapter.

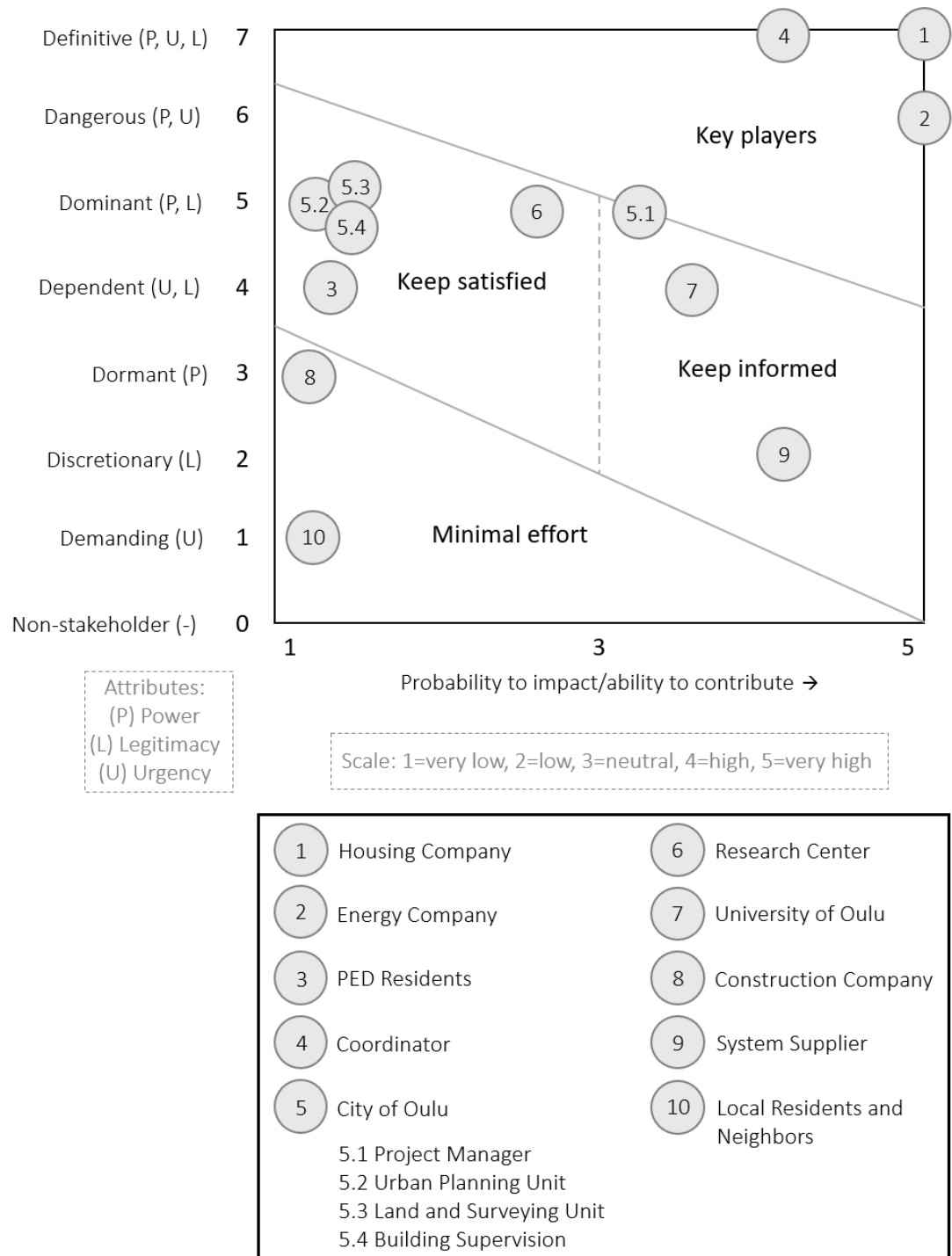


Figure 8. Salience analysis of Case 1: Apartment Buildings.

1. Housing Company (P, L, U)

The City-owned Housing Company can be seen as a definitive stakeholder and a key player in the case, since they possess all three attributes. Their **power** comes from independent decision-making when it comes to their apartment buildings and their role in

the PED. Even though the schedules and energy solutions are agreed in collaboration with other actors, the Housing Company did have full control over the final result, as the buildings are their company's products. When it comes to the open-ended collaborative business model between the Housing Company and the Energy Company, the power positions of the actors will show once the negotiation on the contract is had. The Housing Company owns the buildings and parts of the energy equipment, which gives them power in the discussion on pricing and compensations. On the other hand, the Energy Company has full control over their own pricing, which puts them in a possibly higher power position.

Legitimacy comes from the assumption that the actions of the Housing Company are desirable and proper in the project, since they pursue an end result that is satisfying for the City of Oulu politicians and the residents that are also the end-users in the PED. **Urgency** of their claims is clear: their claims and wishes call for immediate attention and should be taken into account in decisions concerning the apartment buildings. The PED network will be affecting their work and buildings in the area many years into the future, which makes them a central actor with urgent and critical claims.

2. Energy Company (P, U)

The Energy Company can be seen as another key player in the case, as they possess power and urgency for their claims and are likely to contribute highly to the decision-making. They have **power** over other actors in the case because of their role in the project. From the beginning, they have had certain normative power that comes from them being the only energy utility in the region while also being owned by the city. They also own the district heating network that works as a base for all the energy solutions in the PED, which puts them in a powerful position in the whole ecosystem. As the project went on to the planning and implementation phase, their power arose from their competence and know-how in energy systems. A concrete example of their power is the modification of the system from a centralized system to a decentralized one, which can be seen as an alteration to their preferred direction, while possibly delaying the work of other actors in the PED. On the other hand, their relationships with other stakeholders in the PED project are based on mutual trust and beneficial cooperation, which gives them little reason to utilize their power any further.

Similarly as for the Housing Company, the decisions in the case for the Energy Company are not only project-related, but rather define the whole direction of future work in the company. They are keen to influence the decision-making, and their claims are **urgent**, because once the 60-month EU project is over, the PED ecosystem stays in operation with its energy solutions and collaborative business models. Their probability to impact is also very high as they are a central actor in the case and in the whole project.

3. PED Residents (L, U)

The future residents of the Housing Company's apartment buildings are dependent stakeholders with low ability to contribute. They possess **legitimacy** because of their role as an end-user in the project; each decision should be made with their living requirements in mind. Their claims can be seen as appropriate and wished for, since their satisfaction with the end-result partly determines the success of the whole project. Their claims are also **urgent** and call for attention, as their decision to rent a PED apartment is vital for the area to be useful and profitable. However, their probability to impact is not very high. They are informed and taken into account in the decision-making, but they have little chances of actually affecting the more important decisions.

4. Coordinator (P, L, U)

Third key player in the case is the Coordinator, possessing all three attributes. They control the entirety of the PED project, and ensure its progression on local level, EU level, and on the individual work packages' level. Their **power** arises from their coordinative position in the project. Even though their role seems remote at times when the actors in Oulu are deciding on certain details on local level, their actions affect the decision-making especially schedule-wise, as their confirmation is needed for changes in the plans.

Legitimacy comes from the fact that they are a non-profit research institution that was selected to take the lead willingly by the partners in Oulu. Their actions can be seen as unbiased and aiming to increase the quality of the project outcomes. However, they are still an organization with goals and deadlines of their own, and they need to ensure results in the project. Hence, they also possess **urgency** and criticality for their claims.

5. City of Oulu

5.1 Project Manager (P, L)

The Project Manager coordinates the project and its actors' collaboration on a local level, and therefore they have **power** over the project's course. Their claims can be perceived as **legitimate** since they were chosen to manage the project by the City of Oulu. However, the style of management in the project seems more conversational than hierarchical, and the emphasis is mostly on shared leadership. Major decisions are left to the companies instead of the city or project manager getting too involved. These circumstances lower the Project Manager's ability to contribute, putting them somewhere in between being "key player" or "keep informed".

5.2 Urban Planning Unit + 5.3 Land and Surveying Unit (P, L)

Both the Urban Planning Unit and the Land and Surveying Unit can be seen as stakeholders with **legitimacy** and **power**. Their work aims at ensuring controlled development of the different regions in Oulu, and negotiating agreements with fitting landowners to the areas, giving their claims a legitimate base. Other parties in the project acknowledge that these units have to treat every actor equally and fairly when forming the agreements. They also had the power to plan the area of Kaukovainio in a way that enabled the PED project and determined project partners. If the Land and Surveying Unit would have chosen to propose a different part of city for the PED area, the actors of the project would have been different. These unit's actions affected the baseline of the project, but their role was not that central during the actual PED project, hence the relatively low ability to contribute.

5.4 Building Supervision (P, L)

An important unit in the City of Oulu when it comes to any construction in Oulu area is the Building Supervision. It promotes, guides and controls the creation and maintenance of the building stock in Oulu and deals with construction-related permit issues. In the PED project, Building Supervision had **power** to contribute to the building's solutions in the planning phase. They also possessed the power to admit or withhold permits for construction in the PED area. **Legitimacy** comes from the fact that this unit ensures a controlled state of the building stock and oversees public interest in Oulu.

6. Research Center (P, L)

The Research Center is a dominant stakeholder with a central role especially in the early phases of the project. They had a **powerful** role in designing the PED network with the Energy Company and rest of the partners because of their expertise and know-how in the technical planning. Their **legitimacy** derives from their unbiased position in the case: they provide knowledge and support to the key players as a non-profit government-owned organization. Their claims are credible and desirable, and they have a history of collaboration with multiple project actors making them a reliable partner. Even though they were a central player in the beginning, their role has shifted further from the center after the planning phase ended, and the key players in the case continued work more independently. This is why their ability to contribute is marked relatively low in the matrix.

7. University of Oulu (L, U)

University of Oulu has had a central, **legitimate** role throughout the project. The idea of a PED and the first actions to open the conversation with relevant actors came from the University. Since then, they have supported the project partners, provided research resources, coordinated the collaboration, and stayed in close communication with the Coordinator. The University's role in the work packages of the whole project is vital, as they do collaboration with different actors to develop integrated planning measures and scrutinize project impact. **Urgency** of their claims comes from the motivation to also get their own interests and objectives, such as new innovative research, fulfilled in the project. As they have been an active partner in the project, their ability to contribute is marked relatively high.

8. Construction Company (P)

The Construction Company can be seen as a dormant stakeholder with little ability to contribute. Their **power** arises from the land use agreement made before the start of the PED project, which allowed them to start constructing and selling their own apartment buildings before the Housing Company could start building theirs. This arrangement caused some undesirable waiting for the Housing Company and Energy Company's collaborative work with their apartment buildings and the EU funding linked with it. In

the beginning of the PED project planning, it also was the Construction Company that had the most thinking to do before giving their full commitment to the project. In a sense they held the power to stop the whole project during those times. However, they demanded minimum effort as a stakeholder in this specific case, since they did not influence the case in other ways later on.

9. System Supplier (L)

The System Supplier has **legitimate** claims. Their competence in the energy solution business is the reason they got selected as the supplier for the apartment building projects, so their actions in the case are seen as proper and wished for. They helped the Housing Company and the Energy Company on important planning and installation matters during the project, so their opinion is being heard. Their ability to contribute is relatively high as they have the significant role of delivering equipment that works as a base for the whole PED network.

10. Local Residents and Neighbors (U)

The inhabitants of the center of Kaukovainio and neighbors of the PED have their own interests in the case. Their claims for a well-functioning and satisfying living environment are **urgent** with no legitimacy or power to back them up. Their opinions have still been heard in the workshop where they voiced their dissatisfaction with the center of the district, so the renewal of that area is partly their achievement. But even though their needs have been taken into consideration, their ability to affect the decision-making during the actual PED project has been very low.

3.4.2 Case 2: Grocery store

The second case is an analogical case description with the first one. Its events take place in the same PED project in Kaukovainio but are focused on the planning and building of the grocery store that works as a central energy producer in the PED network. This case narrative describes the collaborative work of the Grocery Company and the Energy Company and presents the events and actors of the story. In order to fully comprehend the narrative of this case, reading the previous chapters “Background story of Kaukovainio PED” and “Case 1: Apartment buildings” are recommended. The two cases share the same main events but different points of view are emphasized. The case

narrative is followed by a salience analysis of the actors. Different stakeholders are *italicized* in the text when mentioned for the first time to highlight their involvement in the project.

Case narrative

When the district of Kaukovainio was undergoing plans of renewal in 2010, it was clear that the shopping center with its surroundings was the main source of dissatisfaction for the local residents. At the time, the shopping center was owned by a *Limited Liability Company* consisting of multiple *stock owners*. One of the stock owners was the Grocery Company, who also separately owned one building of the center, this way having a firm footing in the area. The City of Oulu acknowledged that this was a challenging starting point for the reformation: multiple owners and stakeholders meant multiple needs and expectations towards the renewal project. They wanted to ensure a beneficial end result for all parties and execute the new shopping center renewal in a way that would not leave the current owners in a challenging position. It was decided that the new space for the shopping center would be built before the demolishment of all of the existing ones.

For some reason, somewhere along the planning of the renewal all of the smaller stock owners dropped out of the project, and the only actor left was the Grocery Company. The Construction Company, that was interested to get involved in the Kaukovainio center area, was hired as the contractor of the new shopping center. They had a clear interest to start constructing residential buildings in the area and becoming the main contractor of the shopping center got them into a position where that was possible. With similar objectives and motivations in the area, the two companies started to plan the construction of the store.

When the PED ideas started to generate conversation between the University of Oulu, City of Oulu and the Research Center in 2017, the thought of using a grocery store as a part of the PED's energy network came up. The Research Center had created plans to utilize the heat produced from a store's refrigeration appliances and this way produce heat for the rest of the PED buildings. As the Grocery Company already had an agreement with the city to build a grocery store to the center of Kaukovainio, they seemed like a suitable partner for the project. The Research Center also had other ongoing projects with the Grocery Company at that time, making the possibility for a new collaborative project

even more apparent. As the Grocery Company agreed to join the PED project, the plans for their role as a heat producer in the network could be started.

When the meetings with the whole project group in Oulu began with the technical planning of the PED entity, the Grocery Company started to plan their store's energy solutions together with the Energy Company. The two companies ended up starting an open and public collaboration where they develop new ways to reach carbon neutrality and utilize renewable energy in the grocery store business. The cooperative work they did in the PED project would work as a kind of pilot project for their future work together. They both had a strong will to create new innovative business models that are based on environmentally friendly energy production in the context of grocery stores and open up new possibilities for shared work in the future.

As the technical planning of the store's energy solutions went along, it was time to agree about the details. The Grocery Company and the Energy Company made decisions on which of them would invest to the installation of certain systems and own the equipment. The lighthouse city application was made as a collaboration of the whole project group, led by the Research Center, and it included detailed technical descriptions of the PED technologies and energy network. As it was known that the grocery store would be built a lot earlier than the rest of the PED buildings, the upcoming heat network infrastructure had to be taken into consideration during the construction of the store. Eventually the application was accepted at the EU level, and the PED project in Oulu got a green light to get started.

The store with its energy systems was constructed with the Construction Company as the main contractor. Multiple subcontractors hired by the Grocery Store and the Energy Company also worked with the store's HVAC, electricity, refrigeration appliances and the energy systems. The store's energy efficient solutions included a carbon dioxide based refrigeration system, energy efficient LED lighting, condensing heat recovery and solar panels amongst other things. The surplus energy that could not be utilized by the store itself would be transferred to other PED buildings through a low temperature heat distribution network.

Shortly after the official launch of the project towards the end of 2018, the Energy Company realized that the original plan for the PED energy network in the application

was not executable. The whole project group had to move from the agreed new low temperature heat distribution network to a decentralized system that worked along the existing district heating network. As the grocery store had already been built with the original plans in mind, some of the energy systems had to be taken out and replaced with different ones. The modification ended up being somewhat inconvenient for the Grocery Company, as it resulted in some technical difficulties to the transferring of the produced energy from the store into the district heating network that are still being resolved today. The low temperature heat distribution network would have been their preferred choice and a more beneficial option when it comes to the heat produced by the store. The project partners in Oulu accepted the change anyway since it was the only feasible way to execute the PED and each actor was committed and ready for the collaboration.

At the moment the store is operating and producing energy to the district heating network. The Research Company measures the energy production and collects various data in order to find optimal ways of utilizing the energy systems. The process is at a learning phase in which alternations are made to the systems in order to increase the operating efficiency. Information about the carbon neutrality and the energy efficiency of the store is given to customers in the store's spaces. There are informative stickers in the refrigeration appliances and the floors to communicate the environmental aspect of the store's solutions. A screen through which the energy consumption and production of the store can be followed is also planned and soon implemented.

The Grocery Company does not have a contract with the Energy Company on their shared business model yet. The collaborative work is based on mutual trust and a verbal agreement that both of the actors support. The basis of the business model is that the Grocery Company produces energy to the district heating network owned by the Energy Company and should be compensated some amount of money for that. The grounds of the pricing politics are still under discussion, and whether the pricing should be energy-based, power-based or a constant payment is not decided yet. Both of the actors want to keep track of and learn more about the energy amounts and efficiency before anything final is agreed when it comes to pricing. This project is viewed as a pilot and a learning experience, and if new collaborative grocery store project should occur in the future between the two companies, they will have better understanding of the business model and pricing of the energy.

Saliency analysis

The following saliency analysis is conducted with the matrix by Aapaoja and Haapasalo (2014). As both of the cases of the empirical research take place in the same project, they share a lot of same stakeholders. Stakeholders with only a coordinative, decision-making or legislative role in the project have similar saliency in this case as in case one. Thus, the saliency analysis of case one works as a base for the following matrix.

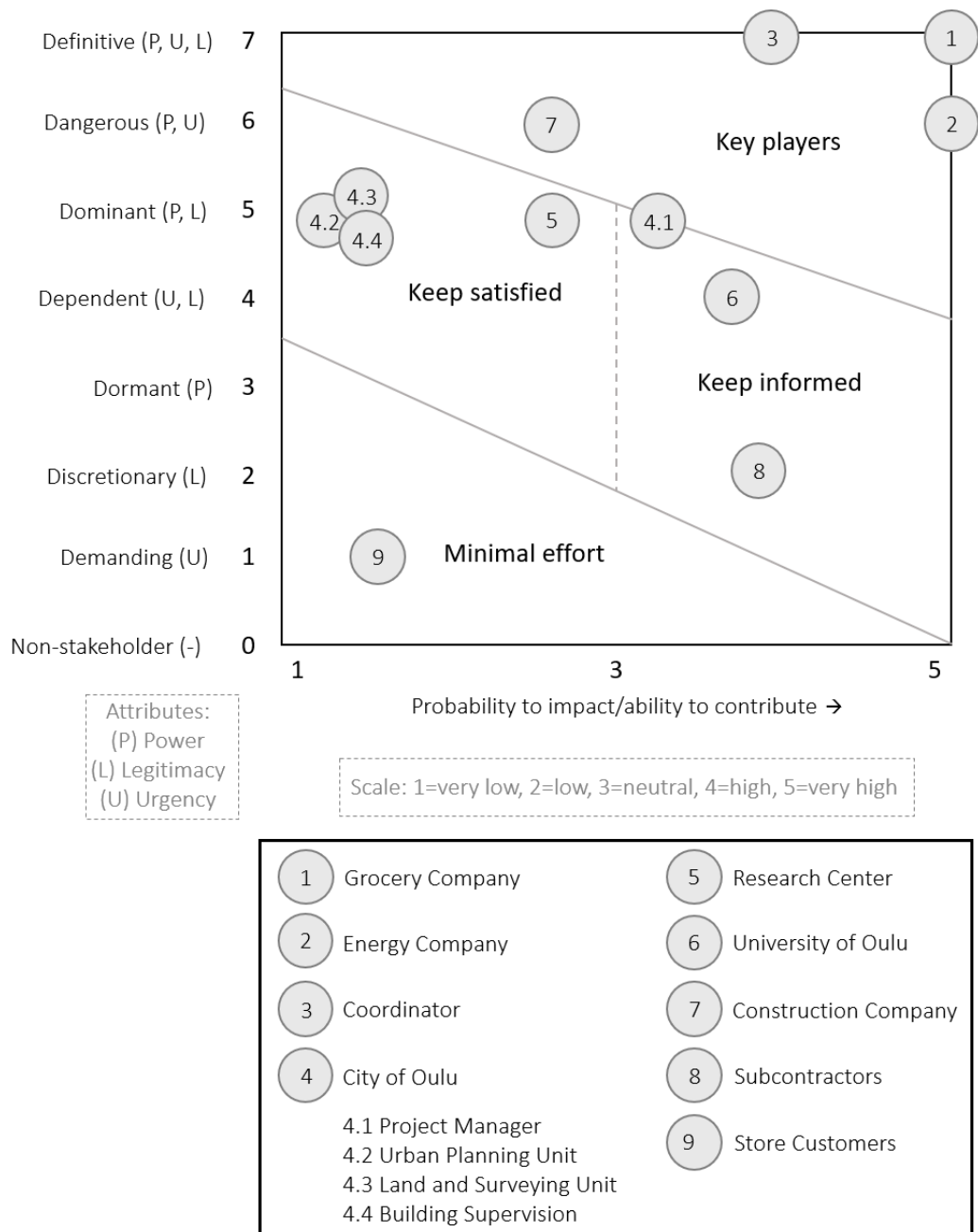


Figure 9. Saliency analysis of Case 2: Grocery Store.

1. Grocery Company (P, L, U)

The Grocery Company clearly possesses all three attributes in the case of building their grocery store as part of the PED. They have the most **power** when it comes to the decision-making of the store's final solutions. They were included in the technical planning and had a say in what kind of systems were to be integrated to the store spaces. Energy-wise, the store was originally planned to work independently without the district heating system or other outside energy, which also gives them certain kind of power: any time during the project they could have pulled away and made the store work as a separate solution without linkages to the PED network.

The **legitimacy** of the Grocery Company's claims comes from the acknowledgement that they have a motivated and determined attitude towards the PED project. Many interviewees mentioned them as the most committed actor that was willing to take risks in order to invest in the future and continue the collaborative work towards an energy efficient network. Their claims are also **urgent**. They have a position in the project that makes them a central actor whose wishes and requests have to be heard and dealt with. This is also why their ability to contribute is marked as high.

2. Energy Company (P, L, U)

Another key player with all attributes is the Energy Company. The PED project is only a pilot-like start to their bigger collaboration with the Grocery Company towards common carbon neutral solutions and novel energy systems in stores. The public collaboration and partly shared future work make the two companies trust each other and share the **power** in this case equally. The Energy Company planned and implemented the energy solutions to the store and this way had a say in many of the decisions concerning the store. They also utilized their power position in the modification of the original plans which caused delays and technical difficulties to the Grocery Company.

The Energy Company's claims can still be viewed as **legitimate**. They are handling the PED grocery store project as a learning experience and want to find the best possible ways to create new energy efficient business models that are shared with the Grocery Company. They put effort into developing the common work and their interests in the case can be viewed as proper and called for. As a central actor in the whole project they also possess

urgency and criticality for their claims and have a high probability to impact, as seen in the case description.

3. Coordinator (P, L, U)

Same role as in salience analysis of case one:

Another key player in the case is the Coordinator, possessing all three attributes. They control the entirety of the PED project and ensure its progression on local level, EU level and on the individual work packages' level. Their **power** arises from this coordinative position in the project. Even though their role seems remote at times when the actors in Oulu are deciding on certain details on local level, their actions affect the decision-making especially schedule-wise, as their confirmation is needed for changes in the plans.

Legitimacy comes from the fact that they are a non-profit research institution that was willingly selected to take the lead by the partners in Oulu. Their actions can be seen as unbiased and aiming to increase the quality of the project outcomes. However, they are still an organization with goals and deadlines of their own, and they need to ensure results in the project. Hence, they possess also **urgency** and criticality for their claims.

4. City of Oulu

4.1 Project Manager (P, L)

Same role as in salience analysis of case one:

The Project Manager coordinates the project and its actors' collaboration on a local level, thus has **power** over the project's course. Their claims can be perceived as **legitimate** since they were chosen to manage the project by the City of Oulu. However, the style of management in the project seems more conversational than hierarchical, and the emphasis is mostly on shared leadership. Major decisions are left to the companies instead of the city or project manager getting too involved. These circumstances lower the Project Manager's ability to contribute, putting them somewhere in between being "key player" or "keep informed".

4.2 Urban Planning Unit + 4.3 Land and Surveying Unit (P, L)

Same roles as in salience analysis of case one:

Both the Urban Planning Unit and the Land and Surveying Unit can be seen as stakeholders with **legitimacy** and **power**. Their work aims at ensuring controlled development of the different regions in Oulu, and negotiating agreements with fitting landowners to the areas, giving their claims a legitimate base. Other parties in the project acknowledge that these units have to treat every actor equally and fairly when forming the agreements. They also had the power to plan the area of Kaukovainio in a way that enabled the PED project and determined project partners. If the Land and Surveying Unit would have chosen to propose a different part of city for the PED area, the actors of the project would have been different. These unit's actions affected the baseline of the project, but their role was not that central during the actual PED project, hence the relatively low ability to contribute.

4.4 Building Supervision (P, L)

Same role as in salience analysis of case one:

An important unit in the City of Oulu when it comes to any construction in Oulu area is the Building Supervision. It promotes, guides and controls the creation and maintenance of the building stock in Oulu and deals with construction-related permit issues. In the PED project, Building Supervision had **power** to contribute to the building's solutions in the planning phase. They also possessed the power to admit or withhold permits for construction in the PED area. **Legitimacy** comes from the fact that this unit ensures a controlled state of the building stock and oversees public interest in Oulu.

5. Research Center (P, L)

The Research Center has a dominant position in this case. From the early phases of the project they have been highly involved as the designer of the whole PED network and through their expertise they have had **power** to their claims. In both of the cases their powerful position is emphasized in the beginning of the project and their role was decreased as the project went on. As they possess knowledge and experience of the grocery store's energy systems, their claims can be seen as **legitimate**. At the moment they are measuring and collecting data from the store's systems in order to develop them

further and track their efficiency. Thus, their interests in the case are legitimate and justifiable.

6. University of Oulu (L, U)

Same role as in salience analysis of case one:

University of Oulu has had a central, **legitimate** role throughout the project. The idea of a PED and the first actions to forward the conversation with relevant actors came from the University. Since then, they have supported the project partners, provided research resources, coordinated the collaboration, and stayed in close communication with the Coordinator. The University's role in the work packages of the whole project is vital, as they do collaboration with different actors to develop integrated planning measures and scrutinize project impacts. **Urgency** of their claims comes from the motivation to get also their own interests and objectives, such as new innovative research, fulfilled in the project. As they have been an active partner in the project, their ability to contribute is marked relatively high.

7. Construction Company (P, U)

The Construction Company can be seen as a **powerful** stakeholder in the case. Through becoming the contractor of the grocery store they became a central actor in the area and got a footing for further work. This position made it easier for them to get permission for residential construction in the area in addition to the shopping center. As the contractor they had power over the store's construction and the decision-making concerning it as well. This key role made their claims **urgent** and critical during the beginning phases of the case, but as the project went along, their role got smaller.

8. Subcontractors (L)

The multiple subcontractors of the store's implementation are combined as one stakeholder in this salience analysis. They all had knowledge and expertise in their own field and they were trusted to execute the work assigned to them. Their claims in the project are **legitimate** and can be seen as justified and wished for. Their competences were utilized both in the planning and in the implementation of the store's systems, and

their role in the case was crucial. Their ability to contribute and probability to impact is high.

9. Store Customers (U)

The customers of the grocery store are not very salient in the case. They are the end-users of the project outcomes, but the energy solutions have little to do with their customer experience. The store was planned with their requirements in mind which makes their claims **urgent** in the case. However, the fact that the store is a part of a PED network does not necessarily impact the customers in a way that makes them a salient actor. Their ability to contribute is thus marked as low.

3.5 Empirical analysis

In this chapter the cases of the empirical research are analyzed based on the results of the literature review. In order to analyze the case project, the events of the case narratives are compared to the stakeholder prioritization cornerstones listed in the synthesis of the literature review, which are: Identify, classify, prioritize according to salience and probability to act, evaluate stakeholder strategies, involve actors at an early stage, engage and integrate, manage and coordinate.

As the case project is executed as a part of the MAKING-CITY research project, it has unique stakeholders and features that are not necessarily involved in all future PED projects. The case project's partners include research institutions such as the Coordinator, the University of Oulu and the Research Center, all of which are relevant and salient stakeholders in the cases. However, in a local PED project that is not conducted in a research focused setting, these stakeholders would not have a similar salience as in this analysis. The EU research project aspect also means that the project partners get a 70-100% funding for their investments in the project in the form of depreciations, which provides a certain amount of security for planning and investing, setting this PED project apart from those that do not receive EU funding.

3.5.1 Identify & classify

All of the stakeholders with direct or indirect relevance to the project were identified well in both cases. When the PED planning got to an official start, relevant actors needed for the implementation were taken into the conversation. This identification was done mainly by the representatives of University of Oulu and City of Oulu, who knew what kind of expertise and knowledge would be needed for the PED. Identifying the stakeholders that would later have influence over the PED project decisions was necessary in order to start planning the area as realistically as possible.

Since there was no one particularly responsible for stakeholder management, it is unclear if any specific classification of the stakeholders was made. All of the organizations involved can be seen as internal stakeholders that in addition to expecting something from the project also have a contractual relationship or give inputs to the project. External stakeholders are those who are not in the actual project group, but who are affected by it, in these cases the future PED residents and neighbors and the store customers. External stakeholders were taken into account in case one by hosting an information event by the Housing Company, city and university, as well as asking for their opinion when the city was renewing the area in the beginning. However, many interviewees felt that informing external stakeholders and non-stakeholders on the PED project was not at a sufficient level and would have required more efforts.

3.5.2 Prioritize according to salience and probability to act

Managing a wide range of stakeholder interests equally and with the same emphasis is problematic because of conflicting interests and limited resources. The various stakeholder claims in the cases should be balanced by the management in a way that doesn't compromise the purpose of the project. Since there was not any official stakeholder management conducted in the cases, there was no clear vision of who's claims should be prioritized. Majority of the decision-making was left to the companies, which according to the interviewees, sometimes led to a situation where parties with the loudest voice got their agenda through. On the other hand, earlier collaboration enabled a level of trust between the project parties that made the cooperative decision-making easy: the parties did not have to doubt each other's aims and objectives, but they could rather trust the opinion of the actor with the most expertise in a certain decision.

Conflicting interest still occurred in the land use agreements, altering of the original energy system plans and EU funding details. Competing claims can possibly be faced also in the discussions of the shared business models and open-ended pricing politics in the future. The power position shifted between the actors as the project evolved, and different parties' ability to contribute changed depending on the situation as well. In order to allow sensible and justifiable decision-making and resource allocating that ensures satisfaction for all parties, the management should be able to place the competing claims in an order of prioritization. The shared leadership style in the case made collecting and analyzing the different stakeholders' requirements uncontrolled and disorganized at some points of the project.

3.5.3 Evaluate stakeholder strategies

Stakeholder strategies were perhaps assessed by different actors throughout the project, but there was no official evaluation process mentioned in the interviews. A mapping of the Oulu project partner's business models was conducted by the MAKING-CITY project group, but specific strategies of the parties are not analyzed. Assessing the means by which stakeholders shape their dynamic position and salience in the project is vital for the management in order to respond to the pressures and claims expressed by them. In a sense the positions of the cases' stakeholders were quite clear, since two of them were city-owned companies, three of them were research or education institutions, and two were private companies. This starting point and its effects on the project's decision-making were acknowledged by the central actors in the case.

3.5.4 Involve actors at an early stage

All relevant project actors were involved in the PED project as early as possible. From early on, it was acknowledged that these actors were crucial to get included in order to implement the PED in Kaukovainio. From the first discussions to the application phase can be seen as the project front-end, where common goals, concept, scope and direction were shaped by expending time, money and human resources without any guarantee of return. Even though this phase is usually characterized by high levels of uncertainty and dynamic stakeholder interactions, it plays a crucial role in ensuring strategic project success. Because the most salient stakeholders were involved from the beginning, the application was made as a collaboration in which every actor was heard and taken into

consideration when agreeing on the roles, responsibilities, investments and technical solutions.

Even though the planning was started early and done with the whole project group, the original plan ended up being changed from the centralized system to a decentralized one. Some interviewees felt that these kinds of changes and an evolution of the technical plans are inevitable in a long research project where knowledge and competence develop overtime. The uncertainty of answering to an open EU call was also acknowledged; it was not necessarily possible for all stakeholders to put more efforts into something that was not certain yet. There were no guarantees for EU funding for the investments and planning for them had to be done anyway. Others felt that the engagement of stakeholders and demand of full commitment should have been done earlier and more intensely, and the challenging application phase could have been made easier with clearer roles and deeper commitment. They felt that the plans, construction schedules and investment limits could have been more accurate if the planning phase was more managed and organized. Since the front-end is characterized by individual stakeholders attempting to balance their position in the project and maximize their own value creation, it would have been important for the project management to consider the different actors' interests and expectations with a stakeholder management process in order to reduce changes later in the project.

One of the most significant benefits of early involvement is the utilization of the knowledge base of the stakeholders. The case project was lacking this dimension to some extent, as some of the interviewees brought up unclarity in the roles and uncertainty in how to utilize other stakeholder's knowledge. Some expected more support and a more active role from the research organizations in the planning and construction phase, where new ideas and approaches would have benefitted the work. During the front-end it is crucial for the management to clarify roles and help the project partners share information and utilize the common knowledge pool.

3.5.5 Engage and integrate

Stakeholder integration was at a moderate level in the cases. Some engagement activities were practiced to increase inter-organizational integration in order to plan and develop the PED solutions. There were plenty of meetings at a local level with the whole project

group where plans and objectives were discussed. All of the actors also participated in smaller meetings with parties relevant to their work in the PED, where the details of the collaboration were pondered and agreed. The parties supported each other, and cooperation between them was smooth and rewarding. However, the conversation and information exchanged both in meetings and via email was not properly managed, which sometimes led to inefficiency in communication. The structure of the meetings was usually based on each actor presenting the current state of their work one by one, which did not always make the big picture clear.

Engagement activities require clear roles and responsibilities, and especially communication should be controlled and organized in each phase of a project. A well-managed engagement process reveals crucial information about the stakeholders' requirements, underlying assumptions, values, wishes and concerns, which helps with the coordination of the collaboration.

Most of the partners in the cases were already familiar with each other's organizations from earlier collaboration in different projects, which enabled a certain level of integration even without any engagement activities. There was an atmosphere of trust and mutual support between the local partners, increasing the quality of collaboration. Thus, in a way a lot of integration happened naturally without the need for managerial actions. Some characteristics of the case, for example the pricing politics or risk sharing, still imply that decisions were made to optimize each actor's own operations instead of the end-users' or environment's perspective, which should be the mutual goal. A well-integrated project's success should not be determined by the success of a single firm, but instead the whole project team. There was also some unclarity about common objectives, roles of certain actors and the shared business models, all of which could have been made clearer with controlled engagement and deeper integration.

An efficient way of increasing integration and the quality of common work is shared location. As it was not a possible option in a project of this size and nature, the project group had a shared virtual workspace. This space was mainly used for sharing meeting memos, reports, pictures and other materials. Multiple actors in the case did not find the space that beneficial for the collaborative work, and it was not visited often. This space where documents were simply uploaded and no interactive work happened was not necessarily intended to replace the benefits of shared location, but rather store important

information of the project. Information was exchanged in meetings and via email and phone, which suited this kind of project with multiple different simultaneous collaborations maybe better.

3.5.6 Manage and coordinate

The management in the case project was done from two levels: EU level management by the Coordinator and city level management by the Project Manager. The EU level management was seen as problematic at times because of the bureaucracy that is involved in this kind of EU project. Early decisions and plans were challenging to change which caused uncertainty and time-loss, all working phases required extra effort in reporting and meeting participation that sometimes felt unnecessary, and the approach to the project all in all was sometimes felt as different in the local level compared to the EU level. A root for this problem could be in the different conceptions: the companies in Oulu's project group see the project as a local construction and energy project in Kaukovainio, but in reality, it is a research process consisting of various work packages and bigger entities that aim to develop the PED concept overall.

The management in Oulu was mostly based on shared leadership. Some actors saw this as the only possible way in a project of this nature where collaboration was fluent and companies had their own visions and objectives in the project. Some were hoping for a sturdier approach to the management from the City of Oulu. The project was missing a project manager for a while at the beginning, which made coordinative actions unclear. The meetings were arranged and all parties were taken into the conversation, but a more controlled coordination of appearing problems, questions and answers was missing at times. The leadership style leaned on an approach of all actors tending their own issues without any hierarchical management. This worked in some points of the project but caused uncertainty and ineffectiveness in others.

3.6 Empirical synthesis

The empirical research seeks to find answer to the second research question: How were stakeholders and their claims prioritized in the case project? The empirical study was conducted by forming two analogical case narratives from the case PED project in Kaukovainio, Oulu. Stakeholder salience analyses were created of both cases. In the

empirical analysis the case project's events were compared to the stakeholder prioritization cornerstones identified in the literature review. Results are summarized below in table 3.

Table 3. Summary of the results of the empirical research.

RQ 2: How were stakeholders and their claims prioritized in the case project?	
Identify & classify	Internal stakeholders were identified well and included in the conversations from the beginning. External stakeholders were identified and considered by hosting an information event to the local residents. The overall informing of the project could have still used more efforts and focus.
Prioritize according to salience and probability to act	No conscious prioritization process was executed as project decision-making was done mostly with shared leadership. Conflicting interests occurred concerning the land use agreements, modification of the original plan, EU funding details and will possibly occur in the open-ended pricing politics. Collection of stakeholder requirements and expectations was not conducted at a controlled way throughout the project.
Evaluate stakeholder strategies	No official evaluation of stakeholder strategies to help answer to stakeholder pressures was conducted. Strategies were still quite clear, as some partner companies were city-owned and some

	private, which affects their decision-making basis.
Involve actors at an early stage	All actors were involved early, which enabled thorough collaborative planning. The early phases still included uncertainty and delays due to an alternation of the agreed plans. Some felt that utilization of each actor's knowledge and expertise was not done to full extent and more support from certain project actors was wished for.
Engage & integrate	Some engagement actions were practiced to increase integration, including regular meetings with the whole project group. There was a high level of trust, motivation and commitment amongst the stakeholders. However, the meetings and other information exchange were not properly coordinated at all times, which led to ineffectiveness in communication and unclarity of roles and objectives.
Manage & coordinate	Management was both at EU level and local level. EU level management brought bureaucracy and highlighted aspects that were not always understood by the project partners. Local level management was mostly based on shared leadership, which worked in some points but caused uncertainty and ineffectiveness in others.

4 FINDINGS

The third and final research question is answered in this chapter through a model created for stakeholder management in PED projects. The model was created based on the findings of the literature review and the results of the empirical research. It explains what kinds of aspects should be ensured in order to manage the complex stakeholder network of a PED project. Stakeholder management based on the identified steps is crucial for a PED project to succeed and reach advantageous results for the project and each actor. The steps of the model are presented and explained below.

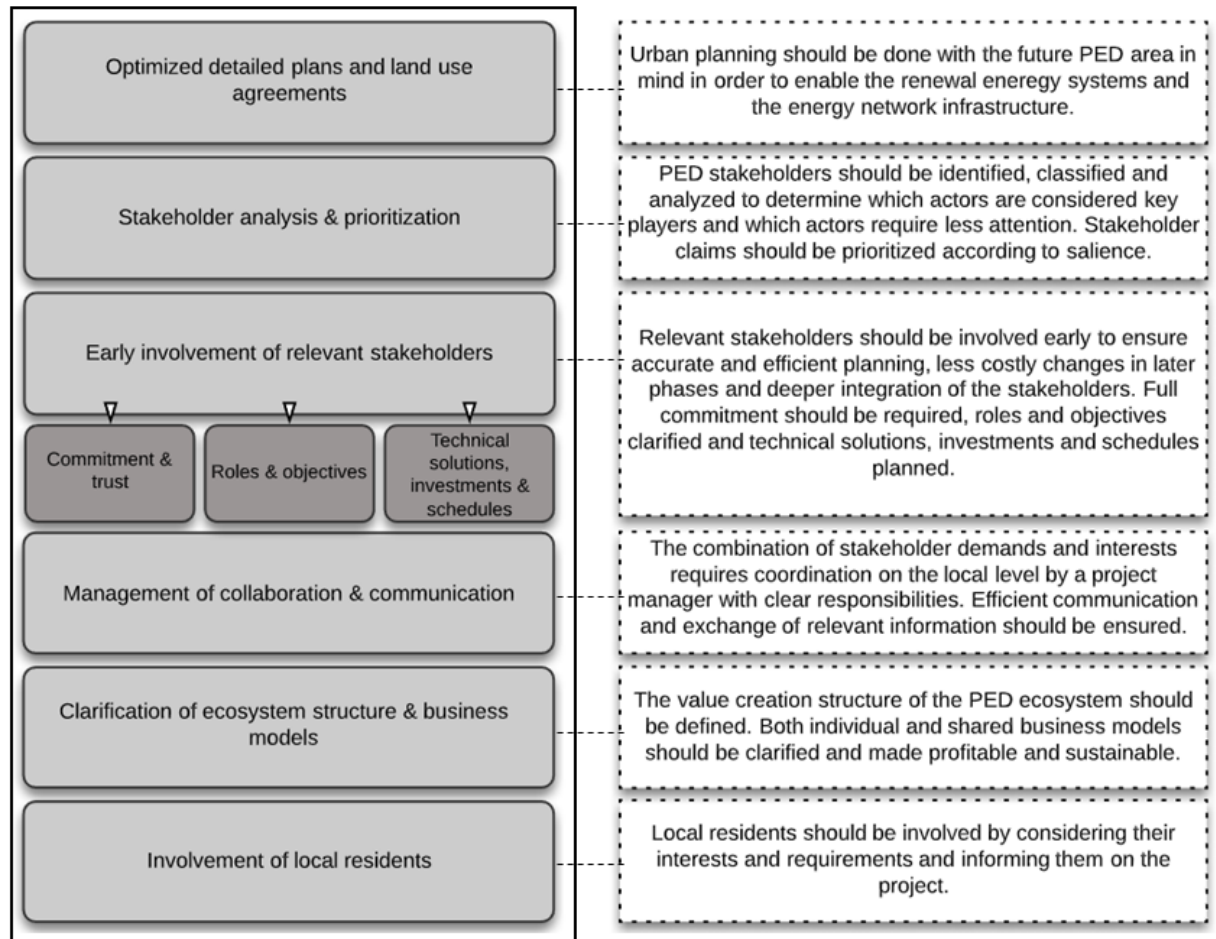


Figure 10. A model for stakeholder management in a PED project.

4.1 Optimized detailed plans and land use agreements

The empirical research indicates that the existing detailed plans and land use agreements of a potential PED area have a significant impact on the PED project. Detailed plans define the direction of the urban development in the area by determining buildings' purposes, sizes and locations, plans for safe and efficient traffic and transportation, ensuring services, health and comfort for the residents and retaining proper nature and park areas. Land use agreements determine how the owners or tenants of the properties will execute the detailed plans for the area, and the agreed issues include the amount of compensations from the landowner or tenant to the city, schedule of constructions, and responsibilities and rights of the contract parties. Thus, in a way these plans and contracts set the baseline for the PED project. They determine the actors of the PED, schedule for the new buildings or renovations, and infrastructure around and inside the PED. They can be viewed as an initiator, enabler and precondition for a PED project.

The two cases demonstrate that detailed plans and land use agreements that were made before there was any awareness of and upcoming PED project can cause some challenges later in the project. The detailed plans for the district of Kaukovainio were agreed on years before anyone knew the area would become a platform for a renewable energy network with innovative energy solutions and an ecosystem of business actors. This led to a situation where the PED was implemented in an area that was not the result of systematic planning but rather was decided to fit into the required mold. The existing plans impacted the events, stakeholder's positions and their salience in the project, but they could have been planned in a way that consciously supports the upcoming PED. However, as urban planning is a long process with many stakeholders and phases included, this would elongate the PED project duration possibly with many years, making this option impossible for a 60-month research project such as this one.

In an ideal situation and in the future cases the urban planning should be done with the future PED plans already in mind, in order to ensure thorough planning for the energy network and its actors. This way the infrastructure of the area can be planned to support the use of renewable energy and novel energy solutions, a situation where the existing contracts cause challenges for the PED project is avoided. The urban planning units should be able to require commitment to energy efficient buildings from the constructors of the area in order to ensure and enable the use of new technology in the PED. It is

important to acknowledge the impact of these plans and contracts in order to manage and coordinate the stakeholders and their collaboration in a PED project. As the role of the city and its urban planning units is significant in this coordination, their planning processes should be developed in a way that reinforces the planning of well-functioning energy efficient districts.

4.2 Stakeholder analysis & prioritization

A PED project involves multiple stakeholders that play a crucial role in the accomplishment of the project tasks and impact the project's course during the planning phase, construction phase and the operations phase. As the stakeholders come from various industries and have different backgrounds, organization cultures, interests and objectives in the PED, stakeholder management processes are needed to enhance the project management's understanding of the diverse stakeholders and their needs. Stakeholder analysis should be conducted in order to approve the management's ability to make informed project decisions and support the project partners. It reveals information about the expectations of different stakeholders and the pressures they put on each other and the project. Stakeholder analysis should include the identification and classification of the PED stakeholders, evaluation of their strategies in the project, and prioritization of their claims. After the analysis the division to internal and external stakeholders and the key players of the project should be clear.

In addition to reaching the common PED project goals, each stakeholder has their own objectives and interests in the project. Every actor wants to ensure the success of their own operations and keep business profitable throughout the project. An important aspect of planning is making the operations sustainable and cost-effective far into the future as well. This leads to a situation where every stakeholder poses different expectations and needs towards the project and wishes to get their interests through. Since the stakeholder claims can be conflicting and resources are always limited, the stakeholder needs have to be prioritized in a sensible way. A well-managed stakeholder analysis includes a process where stakeholder claims are balanced according to their salience in the project. When stakeholder claims are put to an order of importance, the right actions can be chosen accordingly by the management. Some stakeholders require full attention and two-sided conversation, some can just be kept informed and some require no attention at all. The

stakeholder network is a dynamic and interactive entity where positions of different actors are ever changing. Stakeholder analysis should be an iterative process that is used to evaluate and understand stakeholders and their influence in order to conduct sensible decision-making and resource allocating throughout the project.

4.3 Early involvement of relevant stakeholders

As both the literature review and the empirical research suggest, stakeholders should be involved early enough in the PED project discussion and planning. Early involvement of relevant actors ensures accurate and efficient planning, less costly changes in the later phases of the project, deeper integration of the project partners and more beneficial collaboration amongst other things. Three identified aspects of early involvement are explained below.

Commitment & trust

The cases show that merely involving the stakeholders early is not enough, but that also full commitment should be required from all project partners beyond a certain point. For a partner to fully commit to the project means that they are allocating sufficient resources, reserving time to plan and discuss the project, forming a project group within their organization for the PED project, communicating and informing about the project internally and above all, guaranteeing to deliver their contribution to the project. When all of the project partners are committed to the collaboration, a cohesive and integrated team with mutual trust can start to form. Trust between the stakeholders means that decisions concerning the innovative and novel energy technologies and shared business models can be made in spite of uncertainty. Trust enables an open discussion and transparent operations that ensure an end result that is satisfactory and efficient for all project parties.

Roles & objectives

The main objectives of the project as well as the role of every actor in reaching it should be established during the project front-end. Besides the common objective in the PED project, every project partner has their own separate goals and objectives as well. Early involvement allows for the conscious alignment of these objectives in a way that

maximizes the positive outcomes of the project. The roles of different actors should be determined from the start in order to clarify the structure of the stakeholder network and the upcoming energy ecosystem. In an ideal situation the competences and knowledge of different actors is shared throughout the project, and the project partners get support from each other in challenging project phases. When the stakeholders are aware of each other's roles and competences, the collaboration is more efficient and fruitful.

Technical solutions, investments & schedules

The most concrete benefit from early involvement is accurate planning of the technical solutions of the PED. These systems and technologies can be seen as the most vital and central part of the whole project and the integrative factor between the project partners. The solutions should be planned together with all relevant actors in order to form realistic and feasible plans that enable reaching the PED objectives. Each actor's wishes, requirements and concerns should be collected by the management and balanced in a way that enables a wholesome energy network with systems that not only reach the aim of annual energy positivity but are also beneficial and sustainable for each stakeholder. Regular planning meetings with all actors are needed to exchange information adequately and keep others up to date on the progress of the plans.

The project front-end is also the time to agree on who invests on the equipment and infrastructure. The amount of investments should be assessed as well in order to create a budget for the PED project. Sufficient financial resources should be allocated to the project in order to avoid changes in the later project phases. Schedules of construction for all the PED buildings and energy infrastructure should be agreed on early in the project. Locking down a schedule that is suitable for all actors enables more precise and efficient planning of the upcoming phases and decreases the amount of time loss.

4.4 Management of collaboration & communication

A PED project is a complex entity with multiple stakeholders working towards a mutual goal but each possessing their own individual objectives in the project at the same time. Each stakeholder has their expectations towards the project and its other actors. This combination of demands, interests and claims requires a high level of management and coordination on the local level. A project manager with clear responsibilities is needed to

coordinate the collaboration of the different companies and organizations in the project and ensure the realization of agreed plans and schedules. Each project partner should ensure the planning and progress of their own work, but the project manager leads the direction of the collaboration and is responsible for the common decision-making and communication. They have to retain a clear understanding on which challenges the project is facing and which questions have to be answered at the time.

A concrete way of managing the collaborative work is the hosting of regular meetings. Agenda for the meetings should be clear in order to avoid unnecessary meetings or drifting of the conversation to irrelevant topics. All relevant actors should be present to ensure the consideration of all points of view in planning. The information flow between project partners should be enabled and ensured also outside the meetings. Each actor should have the knowledge they need of other actors work to complete their own work optimally. The progress of the project and the roles and responsibilities of each actor in the different project phases should be communicated clearly.

4.5 Clarification of ecosystem structure & business models

A PED can be viewed as a business ecosystem operating around a renewable energy network where the actors exchange energy and heat between each other. A business ecosystem consists of organizations from various industries working cooperatively and competitively towards a common objective while depending on each other for their mutual effectiveness and survival. Ideally every actor takes part for their own benefit but also share resources, knowledge and technologies with each other for comprehensive value creation. A vital part of the ecosystem's effectiveness is the clarification of its structure. In order to maximize customer satisfaction and the benefits for each actor, the structure of the value creation within the ecosystem has to be defined. For a PED ecosystem this includes planning and determining issues such as the energy flow between the actors, ownership of the energy and heat in each part of the network, investments for the equipment, compensations for the produced energy and maintenance responsibilities for the systems. An important aspect of these decisions is the impact of the seasons to the energy demand: during the wintertime the energy network operates in different circumstances compared to warm summertime. If parts of the value chain are left open

ended, it might put some actors in the PED in a risky position where profitability of operations is uncertain.

A PED ecosystem can be seen as an entity formed by adjusting existing business models of the PED partners. Each actor has their own business model that defines how the organization creates, delivers and captures value. In an ecosystem these business models overlap when companies' value chains are linked to each other forming a value chain network. In a PED it is crucial to plan the entity in a way that is beneficial for each individual organization but also for the whole ecosystem. This is challenging in PED circumstances: there are multiple actors that exchange energy back and forth, which makes the forming of an unequivocal business model problematic. Another challenge is the current legislation that does not support these new shared business models concerning renewable energy. When energy is exchanged between two or more actors, taxation and energy transmission costs come into the picture. It is not sensible or profitable to have these costs taken from every step of the PED network. In order to create new optimized and energy efficient business models that support sustainable development, the legislation concerning energy production and transmission has to be updated.

4.6 Involvement of local residents

A vital part of stakeholder management is the acknowledgement and involvement of external stakeholders in the project as well. If external stakeholders are not taken into account, they might end up opposing the project and impacting it negatively. In a PED project the future residents and customers of the PED buildings as well as the residents of the neighboring areas can be viewed as external stakeholders. The PED project affects their lives both in the construction phase and in the operations phase, which is why they should be considered by the project management. They should be included by informing them on the project, its objectives and purpose, its impact on the neighborhood and its impact on their lives. This can be done by organizing information events where the project partners explain the outlines of their work and provide a possibility for the residents to ask questions and voice concerns. A lower effort involvement would be the distribution of information flyers or booklets that include similar information.

Local residents can also be polled on their wishes for the development of the area or their preferences when it comes to living conditions and energy issues. When the PED end-

users get to voice their opinion and their interests are heard, the project outcomes are more likely to be satisfactory for them. In a PED project this kind of external stakeholder involvement can have an effect on the selling or renting of the apartments. If people are uncertain on what the PED concept means and how it will impact their living conditions, they can be less eager to buy or rent. On the other hand, green values and environmental responsibility can have a positive impact on the purchase decision if informing on the PED issues is done comprehensively.

5 CONCLUSIONS

5.1 Key results

5.1.1 Stakeholder prioritization in inter-organizational projects

The literature review focuses to form a theoretical base for the empirical research of the study. Its aim is to identify actions through which project management can balance and prioritize competing stakeholder claims in an inter-organizational project. It emphasizes the importance of collecting and analyzing information on stakeholders' needs, expectations, backgrounds and behavior and defines the project management's role in coordinating the stakeholder relationships. Stakeholder relationships play a key role in inter-organizational projects and contribute to the achievement of project objectives in such a major way that managerial actions are required to coordinate the dynamic entity. Because of conflicting interests and limitations on resources, stakeholder claims have to be prioritized; every interest cannot be fulfilled equally.

Early involvement and stakeholder engagement throughout the whole project enhance the project management's understanding on which stakeholder expectations are to be prioritized and which requirements met in situations of conflict. Involving relevant actors during the project front-end allows projects to utilize the knowledge base of all stakeholders, recognize and satisfy customer needs better, deepen stakeholder integration, and enable proper exchange of ideas and plans to ensure minimal changes in later phases of the project. All of the identified cornerstones of stakeholder prioritization in an inter-organizational project are:

- Identify & classify
- Prioritize according to salience & probability to act
- Evaluate stakeholder strategies
- Involve actors at an early stage
- Manage & coordinate
- Engage & integrate

5.1.2 Stakeholder prioritization in the case projects

The empirical research was conducted to form a description of the case PED project's events through two case narratives and salience analyses. They revealed information on the case project's actors, objectives, challenges and stakeholder prioritization in conflicting situations. The cases were then analyzed by comparing them to the findings of the literature review and assessing which stakeholder management actions were used and what were the consequences.

Stakeholder prioritization was not always done through conscious actions in the case project. Relevant actors were identified and involved at an early stage and included well in the planning phase, but further management of the collaborative work and stakeholder requirements was lacking at points. Existing land use agreements gave some stakeholders power in relation to others and impacted the project's schedules resulting in some inconveniences. Open-ended business models and the challenge of energy pricing and ownership in a new energy ecosystem affected the salience and prioritization of stakeholders as well. There were no separate stakeholder prioritization processes or evaluation of stakeholder strategies, as the management was mostly based on shared leadership. There were specific points of the project where certain stakeholders used their power over others, but in the bigger picture the actors were quite equal in power. The case project was characterized by high levels of trust, motivation and commitment amongst the stakeholders.

5.1.3 Preconditions for stakeholder management in a PED project

Based on the findings of the literature review and the empirical research a model for stakeholder management in PED projects was constructed. The empirical research indicated that PED projects are complex entities with various stakeholders from different industries, and the coordination of a project of this kind requires managerial actions focusing on the stakeholder relationships and their impact on the project outcomes. The model explains what kinds of preconditions should be ensured in order to manage the complex stakeholder network of a PED project. The model suggests to focus on six preconditions in particular:

- Optimized detailed plans and land use agreements
- Early involvement of relevant stakeholders

- Stakeholder analysis and prioritization
- Management of collaboration and communication
- Clarification of ecosystem structure and business models
- Involvement of local residents

The role of the city and the functionality of its processes is vital in PED projects. Urban planning processes and land use agreements made by the city form the basis of the whole PED project, determining the permitted building types, infrastructure and actors of the area. Urban planning should be conducted in a way that encourages and enables the use of renewable energy and the implementation of a positive energy network in the area. Once the project starts, all internal stakeholders of the PED project should be involved early in the planning processes in order to ensure accurate and efficient planning, less costly changes in the later phases and deeper integration of project partners. Early involvement enables thorough planning of the technical systems, investments and schedules. It ensures the clarification of roles and objectives and enables the formation of trust and commitment amongst the stakeholders.

Stakeholder analysis and prioritization of competing claims should be done by the project management to ensure agreed project outcomes. Information of the stakeholders' expectations, interests and requirements should be collected in order to identify their strategy in the project and answer to stakeholder pressures properly. The collaboration of the various stakeholders requires management and coordination on the local level. A project manager should coordinate the combination of individual actors' work, ensure needed information exchange between the partners and retain an understanding on which challenges the project is facing. External stakeholders should be taken into consideration by informing them on the PED project and its impact in the area and including their wishes and requirements in the planning process.

A PED can be viewed as a business ecosystem operating around a renewable energy network where the actors exchange energy and heat between each other. The structure of the value creation within the ecosystem has to be defined in order to ensure profitability and sustainability of the PED. This includes planning and determining energy pricing and compensations between actors, ownership of the heat and energy in different parts of the system and the structure of the shared business models. A PED ecosystem is an entity that links multiple individual actors' business models together while utilizing new

technologies and shared energy flow. It is crucial to plan the ecosystem structure in a way that is beneficial for each organization while also retaining energy positivity and efficiency.

5.2 Theoretical and managerial implications

This research provided new knowledge about the stakeholder network of a PED project and issues that impact the formation and behavior of it. Stakeholder management has been studied for decades in different contexts, but this kind of narrative study examining the stakeholder relationships and positions in a PED project has not been conducted before. The salience framework by Mitchell et al. (1997) was utilized as PED stakeholder attributes were analyzed and their positions determined. This study provided a model for stakeholder management in a PED project as well as theoretical findings from existing literature and supportive results from the empirical research. The empirical case study unpacked the events of the case project and the analysis validated the findings from the literature review and gave basis to the constructed model.

The findings revealed the importance of managerial actions when coordinating the various stakeholders and their claims in an inter-organizational project that aims to form an energy efficient ecosystem in an urban living environment. The study emphasizes the fact that the stakeholder interests have to be consciously prioritized through different actions in order to maximize positive project outcomes. It highlights the role of the city and its planning processes as well as the importance of clear and well-planned business models within the business ecosystem. All in all, this study expanded understanding on stakeholder management of a PED project, providing results that can be utilized in similar future projects involving inter-organizational stakeholders in an energy context.

5.3 Limitations and future research

The validity of the research is at a good level. The data collected during the study helped answer the set research questions and form an understanding of the researched phenomena. The findings correspond well with existing theories and prior studies, which indicates that the research methods were selected accurately and executed appropriately considering the research context. Data collection about the case project was

comprehensive and conducted in multiple different ways, which helped ensure the accuracy of the information. Interviewees were selected from the central organizations of the case project in order to ensure accurate information to the case descriptions. It is also assumed that the study can be seen as reliable, meaning that if repeated with the same methodology under similar circumstances, the results would likely be reminiscent.

There are still some limitations to the accountability of the study. A narrative research usually requires an even more comprehensive collection of data in order to form wholesome narratives of the studied events. The interviews in this research were held with ten people from different backgrounds in order to ensure collecting all different points of view to the stories. However, an optimal narrative interview requires a confidential relationship with mutual trust between the interviewees and the researcher, which often cannot be formed during a single interview session. In one single interview it is challenging to form a connection that encourages sharing personal opinions and views. It is acknowledged that the interviewees could have left out some details concerning the case project and their organizations part in it, which results in a less detailed or accurate case description and salience analysis. The fact that the covered subjects were delicate and partly confidential also contributes to this assumption. A bigger number of interviewees and a minimum of two interviews per person would have given the study more validity and reliability.

In this research, the PED concept and project were studied in very specific circumstances in Kaukovainio, Oulu. The case project took place within the MAKING-CITY research project, which meant that the salient stakeholders included research institutions and the project partners were able to receive EU funding for their investments. As this is not the case in all PED projects, the salience analyses and other results are not necessarily directly comparable to future PED projects. In addition, the project actors knew each other well from earlier collaborations and had already formed a mutual trust between many of them. This unique setting enabled faster and simpler decision-making and made risk-taking easier. The project partners seemed to assume that every one of them was in it for the shared positive outcomes and did not only take part for their own good. Collaborative work was done with Oulu's common advantage in mind. Another factor that made the research environment quite unique was the monopoly position of the Energy Company. They were the sole owner of the district heating network in the city, which made collaborative work with other actors simple: others only had to work with one company

to agree on energy pricing, planning of the solutions and implementation of the system. It also affected the salience attributes of the actors from the beginning.

In the future PED cities this is necessarily not the case. The energy network can be a fragmentary and complex entity with multiple actors, which makes the PED project's work more challenging. Construction companies, research institutions and other actors may not have ready-made connections and earlier collaboration between them. The city's role in the PED, energy objectives, legislation and their processes in these kinds of projects can also alter depending on the location. The results are therefore not directly suitable for all different PED environments, but depend greatly on the circumstances. However, they do give guidelines as to which issues to take into account when managing stakeholder relationships and what kind of factors affect the PED project's stakeholder network. Besides PED projects, the results can be utilized in other types of inter-organizational energy projects that are executed in urban living contexts. The findings emphasize issues that remain relevant regardless of the specific environment: the importance of urban planning and land use, role of management, stakeholder behavior, communication and the challenge of new, shared business models.

In the future it would be useful to study the PED concept more in different settings. Research could be conducted of the PED planning and implementation in other cities with different company environment, legislation and energy actors. This study revealed the importance of urban planning in energy efficient neighborhoods, but further research is needed in this subject in order to recognize the role of the city and how their processes could better enable innovative energy projects. Another future research opportunity is the ecosystem structure and the shared business models that occur when forming a PED ecosystem. At the moment there are a lot of uncertainties when it comes to pricing and ownership of the energy that is generated using shared equipment and network.

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Appendix 1. Interview questionnaire.

General project-related questions

1. What is your role in your organization?
2. What is your organization's role in the PED project?
3. How and when did your organization join the project?
4. What have been the main phases of the project to your organization?
5. Does the PED project differ from your organization's typical projects?
6. Can you describe the environmental goals of your organization's work in general?
7. What are your organization's objectives in the project?
8. How would you describe your organization's commitment to the project?
9. What were the most challenging points for your organization in the project?

Collaboration and the stakeholder network

1. What kind of collaboration did your organization do with organization X?
2. Which stakeholders were involved in task X?
3. How would you describe the collaborative work in the project?
4. What kind of engaging activities has the project included?
5. How often were meetings organized and who were involved?
6. Which stakeholders did your organization have the most interactions with?
7. Did your organization have sufficient interactions with the most relevant stakeholders to your work in the project?
8. Were your organizations wishes and requirements heard in the project?
9. How were risks and rewards divided between the project partners?
10. Is there trust between the project partners?
11. What could have been done differently from collaboration's perspective?

More specific questions about urban planning, land use, energy systems, business models and energy pricing were included depending on the interviewee.